AVIATION WEEK

AUG. 13, 1951

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The ALBATROSS knows no Scene or Season

Any time may find the GRUMMAN ALBATROSS anywhere . . . over warm Pacific waters or at icy arctic altitudes. Designed for air rescue and other activities on the open sea, this big Air Force amphibian has earned a remarkable record for saving lives during its first year of operation.

Grumman

GRUMMAN AIRCRAFT ENGINEERING CORPORATION, BETHPAGE, L

Contractors to the Armed Forces

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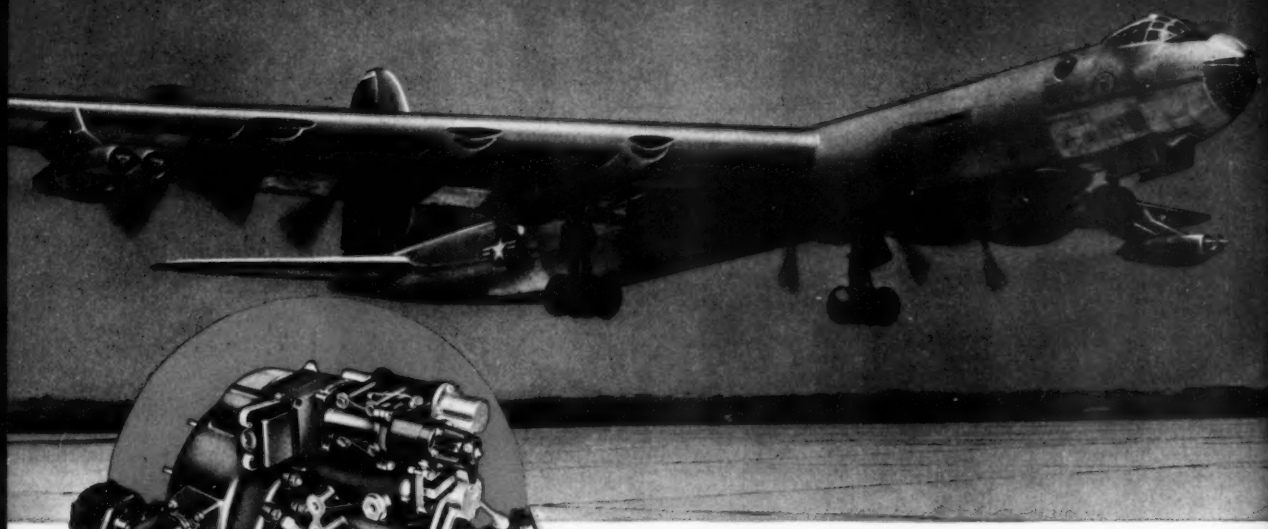
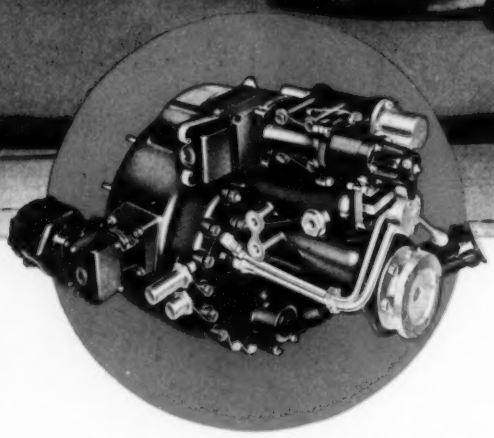
Sundstrand Constant Speed Alternator Drives on B-36's log more than 6500 TROUBLE-FREE HOURS





Service records verify reliability of this precision-built transmission

Studies of service records at Travis, Rapid City, and Carswell Air Force bases reveal that Sundstrand's alternator drive for the B-36 has acquired an enviable reputation for dependable performance. At Travis, for example, there was only one minor accessory adjustment reported in more than 6500 constant speed drive hours logged on B-36's at this base. Similar records are being set at other fields. This remarkably efficient drive—which makes possible greater use of AC power—has so prov itself that aircraft and engine designers are now incorporating it in other types of bombers, transports, fighters and engines. Special adaptations can be developed for you through Sundstrand's *reliable* resear *expert* engineering, and *precision* production.

SUNDSTRAND

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SUNDSTRAND MACHINE TOOL CO.
HYDRAULIC DIVISION, ROCKFORD, ILL.

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LATHES, MILLING, BROACHING AND SPECIAL MACHINES • BROACHING TOOLS • MAGNETIC CHUCKS

B.F.Goodrich

New kind of tire outwears all others in airline tests

A NEW IDEA in aviation tires, designed to give longer service life, has been introduced by B. F. Goodrich.

Instead of the conventional ribbed tread, the new tire has rows of "dimples" – round indentations in the rubber.

B. F. Goodrich engineers had two things in mind in developing the new design: (1) provide better distribution of the load, and (2) reduce exposure to tread cutting. In early airline tests, the results were even better than expected. Other airlines agreed to test the new tires. Various sizes were tested, on DC-3s, DC-4s, and DC-6s.

This report from West Coast Airlines is typical: "We removed the tires after 400 hours, 1200 landings. In the process of recapping, we discovered that there was enough rubber left for about 100 hours more, a total of 1500 landings. These tires have given us longer service than any we have used."

Some of the airlines that tested the new tires and are now using them as standard equipment are Braniff, United, American, Continental, Frontier, National, and West Coast. Still more airlines are now starting to switch.

This new, longer wearing tire is the latest B. F. Goodrich "first" in aviation tires. Others include the first Type II (high pressure), forerunner of the Type VII. The first Type III (low pressure). The first practical prerotation tire. First recommendation of multiple tires for commercial use. First inertia type dynamometer for tire testing. *The B. F. Goodrich Company, Aeronautical Division, Akron, Ohio.*

B.F.Goodrich
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JET IGNITOR
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WESTINGHOUSE
for use in the new super-powerful
J40 TURBOJET

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Auburn has specialized for over seven years in turbo-jet, jet prop and rocket spark plugs and other aircraft ignition parts:

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Aviation Week

ABP Member ABC

Volume 55 **August 13, 1951** **Number 7**

Special Report on ALPA—II 71

Headline News

$15 Billion for Air Power 13
Super Connie Orders Climb to 143 . . 14
NMB Asks End of WAL Strike 16
McDonnell F3H in 1st Test Flight 16
CMB Looks Into NWA Stock Buy . . . 16
Overseas Air Coach Parley Asked 17
Government Aid for Copters 17
Military Jets to Vie at Races 18

Production Engineering

Tool Flexibility for Jet Engines 21
Ingenuity Marks French Patents 29
Ceramic Liners 34
NACA Reports 37

Avionics

Miniature Relays Hermetically Sealed 52

Equipment

Plug Fouling Remedies Discussed . . . 57
Electroluminescence: New Word 65

Air Transport

Curtain Drops on One-Man Show 71
Havana-to-Balboat Run for NAL 73

Editorials

Largest Peacetime Military Budget . . 8
Good Luck to the Air Races 8
Turboprop Leadership 8
Another Look at Flying Boats 8
With All the P.R. Experts 8

Departments

News Digest 7
Sidelights 8
Picture Page 9
Who's Where 11
Industry Observer 11
Washington Roundup 12
AF Contracts 40
New Aviation Products 63
Also on the Market 66
Letters 77
Cockpit Viewpoint 84
Aviation Calendar 84

36,371 copies of this issue printed

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PUBLISHER

R. W. Martin, Jr., *Sales Manager;* J. G. Johnson, *Business Manager;* Anita Scaffa, *Research and Marketing;* Sales Representatives: J. C. Anthony, New York; M. J. Stone, Philadelphia; H. P. Johnson, Cleveland; L. J. Biel, Chicago; W. F. Donnell, St. Louis; James Cash, Dallas; R. C. Maultsby, Atlanta; J. W. Otterson, San Francisco; C. J. McReynolds, Los Angeles. Other sales offices in Pittsburgh, Detroit, Boston, London.

August 13, 1951 AVIATION WEEK Vol. 55—No. 7
Member ABC and ABP

Published weekly by McGraw-Hill Publishing Company, Inc., James H. McGraw (1860-1948), Founder. Publication Office: 99-129 North Broadway, Albany 1, N. Y.
Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 18, N. Y. Curtis W. McGraw, President; Willard Chevalier, Executive Vice-President; Joseph A. Gerardi, Vice-President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice-President, Publications Division; Ralph B. Smith, Editorial Director; Nelson Bond, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Vice-President and Director of Circulation.
Subscriptions: Address correspondence to AVIATION WEEK—Subscription Service, 99-129 N. Broadway, Albany 1, N. Y., or 330 W. 42nd St., New York 18, N. Y. Allow ten days for change of address.
Please indicate position and company connection on all subscription orders.
Single copies 50¢. Subscription rates—United States and possessions, $6 a year; $9 for two years; $12 for three years. Canada, $8 a year; $12 for two years, $16 for three years, payable in Canadian currency at par. Pan American countries, $10 a year; $16 for two years; $20 for three years. All other countries, $20 a year; $30 for two years; $40 for three years. Entered as second-class matter, July 16, 1947, at the Post Office at Albany, N. Y., under Act of Mar. 3, 1879. Printed in U. S. A. Copyright 1951 by McGraw-Hill Publishing Co. Inc.—All Rights Reserved. Cable address "McGraw-Hill New York." Publications combined with AVIATION WEEK are AVIATION, AVIATION NEWS, AIR TRANSPORT, AERONAUTICAL ENGINEERING and AIRCRAFT JOURNAL. All rights to these names are reserved by McGraw-Hill Publishing Co.

EASTERN Air Lines

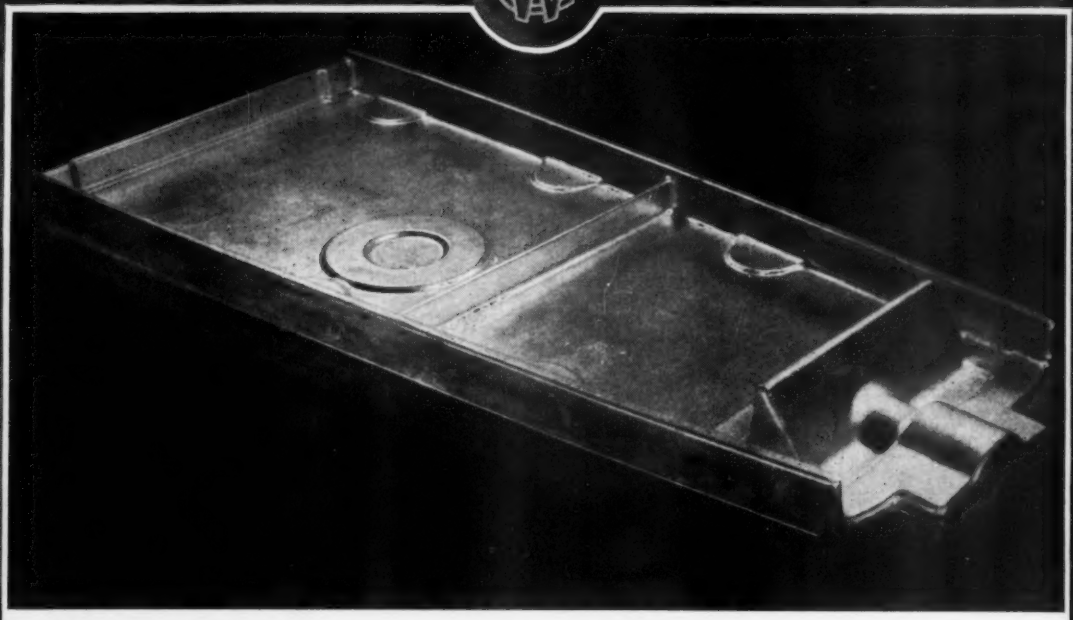
23 YEARS

FAFNIR

Eastern Air Lines is almost as well known for its operating efficiency as it is for its fast, exacting schedules covering better than 160,000 air flight miles daily. For over 23 years, Fafnir has had the privilege of contributing to Eastern's operating efficiency by supplying ball bearings as original equipment or replacement. But something more than just good bearings is responsible for this long association. It's an attitude and an aptitude . . . a way of looking at ball bearings from the user's viewpoint, an aptitude gained from nearly twenty-five years' specialization in aircraft ball bearings. The Fafnir Bearing Company, New Britain, Conn.

PROGRESS REPORT
RESEARCH INTENSIFIED
The flood of orders for Fafnir Ball Bearings as a result of civilian-plus-defense economy hasn't interferred with Fafnir's research activities. In fact, research has been intensified in phases that seek faster methods of production. Fafnir is doing everything possible to catch up with an unprecedented demand for ball bearings.

• **Fafnir Ball Bearing Rod Ends,** one of the Fafnir Aircraft Type Ball Bearings specified by Eastern Air Lines. Fafnir Rod Ends permit a 10% misalignment in either direction. Light compact design. Outer race ground directly on shank member.



Are you taking full advantage of the constantly growing range of forgings? Typical is this aluminum alloy forging with a projected area of more than 1,000 square inches used in the wing structure of a modern military bomber. Such forgings are today made possible by the use of the largest die forging press in America (18,000 tons). For hammer or press die forgings of aluminum, magnesium or steel, Wyman-Gordon engineers are ready to serve you—there is no substitute for Wyman-Gordon experience.

Standard of the Industry for More Than Sixty Years

WYMAN-GORDON

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL

WORCESTER, MASSACHUSETTS

HARVEY, ILLINOIS DETROIT, MICHIGAN

NEWS DIGEST

DOMESTIC

Shipments of complete civil planes, measured in airframe weight, came to 569,600 lb. in May, 1951, the total being 248 planes valued at $10.7 million, compared with 247 worth $13.4 million in April. Total of 384 civil engines valued at $2.8 million was shipped in May, compared with April shipments of 404.

R. S. S. Dickinson has been chosen to replace Group Capt. C. Clarkson as British Civil Air Attache in Washington, D. C., early next year. Dickinson, 46, joined the Ministry of Aircraft Production in 1941.

Republic RF-84F Thunderjet is a photographic reconnaissance version of the sweptwing Sapphire-powered Thunderjet fitted with cameras in the nose and the engine air intake moved to the wing roots.

Personal and executive plane exports of planes weighing 5,000 lb. and under (empty airframe weight) came to 250 planes valued at $1,976,580 as reported to the Aircraft Industries Assn. by nine companies.

Air Transport Carriers, Burbank, Calif., certificated nonsked, has concluded negotiations and renewed two-year agreement with the International Assn. of Machinists.

Col. Harold W. Bowman, formerly deputy chief of staff for personnel, has been named special assistant to the commanding general of Tactical Air Command, Langley AFB, Va. Col. William C. Bentley will take Bowman's former post.

TWA has made rapid recovery from damage suffered when its big Fairfax, Kan., overhaul base was inundated under 12-ft. of water during recent Midwest floods. By July 23, the airline had restored 90% of scheduled mileage in effect on July 1. By July 27, mileage had been upped to 91.5%. Low operating point was 78% on July 16.

Martin Viking rocket set altitude record of over 130 mi. at White Sands, N. M., on Aug. 7. Soaring higher than any other single-stage missile, the five-ton Viking stayed aloft for 10 min., is estimated to have reached a peak speed of 4,100 mph. It hit the earth about 40 miles from the launching point. The previous record for a single-stage rocket was 114 mi., set at White Sands by a rebuilt German A-4 (V-2) on Dec. 17, 1946.

Allison Radar Corp., N. Y. C., has obtained a temporary injunction in Albuquerque, N. M., to prevent inventor Donald K. Allison from disposing of an airborne radar, or selling any of its developments, or divulging any of his designs to a third party. The corporation has also filed a complaint against the inventor to compel him to carry out the terms of contract, under whose terms the firm claims the inventor is to deliver to it a modified lightweight airborne radar for installation in a B-18 demonstrator airplane. Mr. Allison was ordered to appear before the court on Aug. 15.

Stanley B. Kurzina, Jr. has been named vice president in charge of operations of Wright Aeronautical Corp., a new office created as part of a plan to enlarge the company's top management in preparation for defense production expansion.

FINANCIAL

Ryan Aeronautical Co. has proposed to stockholders an increase in authorized capital stock from 500,000 shares of $1 par value to one million shares. The company has declared a quarterly dividend of 10 cents per share on common capital stock payable Sept. 12 to holders of record on Aug. 22.

Glenn L. Martin Co. has arranged a $10 million V-loan to provide additional working capital for financing its expanding military production. The firm's backlog at the end of the first half of 1951 was over $414 million, with sales for the period being $16,747,026, with income prior to adjustment of inventory valuation being $509,860.

Texas Engineering & Mfg. Co. showed net earnings of $489,657.36 after provision for Federal income taxes on sales of $11,900,722.44 for the six-month period ending June 30. Temco's backlog at that time was approximately $135 million. The company has negotiated with a group of banks for a $10 million V-loan.

INTERNATIONAL

Australian Naval Board has ordered a number of DH Sea Venom two-place all-weather fighters from Britain.

Consult your 1951 I.A.S. "Aeronautical Engineering Catalog"

for complete information on AIRBORNE'S

ROTORette — LINEATOR — ROTORAC & Trim-Trol ELECTRO-MECHANICAL ACTUATORS. Also ANGLgear RIGHT-ANGLE BEVEL GEAR UNITS

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The AVITRUC XC-123

LEADER

AVITRUC—result of combined research by Armed Forces and Chase Engineers. Designed to lead the way into forward combat areas—to land troops and supply-handling equipment where needed in the establishment of airheads—to operate from short or undeveloped fields.

Exercise Swarmer proved conclusively the need for such an assault transport.

• *AVITRUC—designed for the job* •

Chase AIRCRAFT CO., Inc.
WEST TRENTON, NEW JERSEY

STROUKOFF AVITRUC

SIDELIGHTS

Washington Notes

▶ Getting and renewing **airman certificates** would be revised under CAB's proposal to issue certificates of 24-months duration only, and renewable every two years. Board plans to convert existing "life-time" certificates to two-year types. Reasons: (1) Let CAA know whether airman is active, inactive, alive or dead; (2) Improve statistics for private and government analysis; (3) Keep U. S. competency standards at least up with the ICAO standard, required by May 1, 1953.

▶ **Warren Lee Pierson,** chairman of TWA, has been named by President Truman as U. S. representative on the Tripartite Commission on German Debts, with personal rank of ambassador.

▶ **Jean Dubuque,** former director of aviation for Dallas, has returned to Washington as an assistant on aviation matters to D. W. Rentzel, Undersecretary of Commerce for Transportation.

▶ **Millard Tydings,** former senator, is now a member of the Washington law firm of Davies, Richberg, Beebe, Landa & Richardson, and has been assigned the Colonial Airlines legal account.

Air Force

▶ **Richard Hodgson** has been named special consultant to Gen. Vandenberg for research and development. Hodgson, president of Chromatic Television Laboratories, Inc., will be associated with Lt. Gen. Jimmy Doolittle, special assistant to the chief of staff, and Dr. Louis Ridenour, top USAF scientist, on television matters.

▶ **Air Weather Service,** part of MATS, has reorganized its U. S. units, with three new air weather groups to serve Strategic Air Command, Air Defense Command and Tactical Air Command with their different weather requirements. Meanwhile, the 2059th Air Weather Wing at Tinker AFB will serve other AF commands here.

▶ **Southeastern Regional Office** of AMC's air procurement district has been established in Atlanta, to supervise AF procurement contracts in Georgia, Florida, South Carolina, Alabama and Mississippi.

▶ **Midcentral Air Procurement District** is establishing six permanent exhibits at Chicago, Milwaukee, Minneapolis, St. Louis, South Bend and Indianapolis to display parts needed by defense plants under USAF contracts and encourage small firms production.

▶ **An Armed Forces Subcontractors Exhibit** at William Penn Hotel, Pittsburgh, Aug. 15-17, will attract subcontractors from Pennsylvania, Ohio and West Virginia.

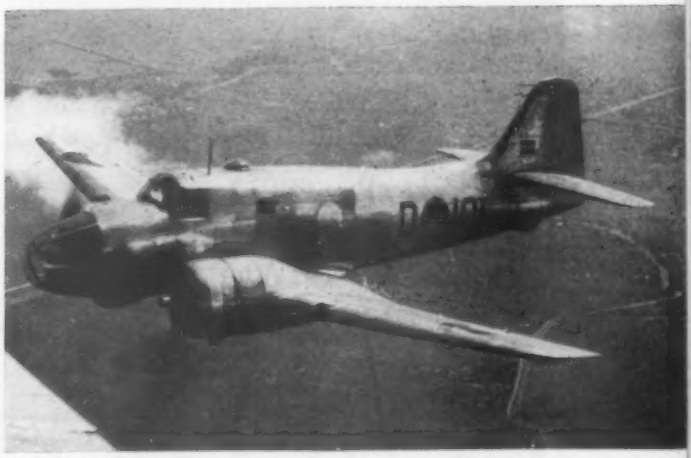
▶ **Youngstown Municipal Airport,** Ohio, has been taken over by Air Defense Command and USAF has requested $6 million from Congress to improve and extend the base.

▶ AF will reestablish **Morrison AFB,** West Palm Beach, Fla., and spend approximately $8.3 million for land and new construction as soon as recapture from the state of Florida is complete. Morrison, which had been turned over to the state for use as Palm Beach International Airport, will be used as a base of operations by MATS.

LATEST HAWKER INTERCEPTOR—The graceful lines of new Hawker P.1067 interceptor are shown to advantage in this photo of the Rolls-Royce Avon-powered jet fighter ordered in quantity by RAF. Bulge above the tailpipe probably houses an anti-spin chute.

Aviation Picture Highlights of the Week

ACCLIMATED BUCCANEER—Two new Vought Corsairs (above), the F4U-5NL (nightfighter, winterized) in formation. Wings and tail are fitted with de-icers. Engine is P&W R-2800-32.

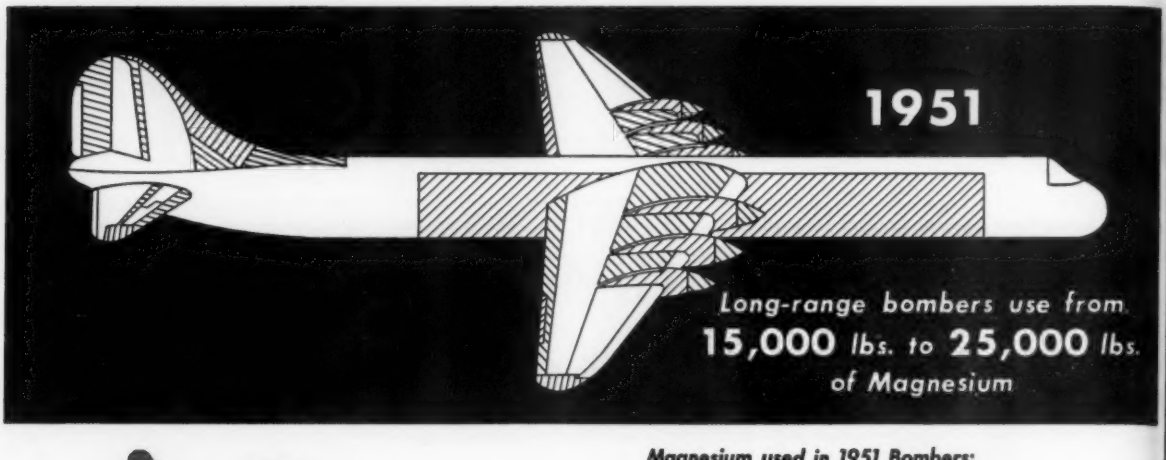


AERIAL CLASSROOM—New Fokker S-13 twin-engine trainer for pilots, bombardiers and navigators has two P&W Wasps of 600 hp. each, turning three-blade Hamilton Standard constant speed props.

SUPER CONNIE CABIN—Impressive view of the new Lockheed 1049 Super Constellation's interior (left) shows 83 ft. 2 in. cabin for the first time. Passenger capacity is increased about 35% over previous models, cargo capacity is up 65%. Plane shown is first production model, going to Eastern Air Lines (story p. 15).

LIGHT TWIN—Four-place all-metal plane (below) powered by two 85-hp. Continental engines was designed and built by Frank Crosby, T. J. Harrick and Robert Welborn in Illinois. It grosses 2,400 lb., cruises at over 135 mph.

THEY'VE GOT *"More Get-Up-and-Go!"*



1940—Long-range bombers used 1,000 lbs. of Magnesium in Engine castings and wheels

Magnesium used in 1951 Bombers:

- Fuselage skins
- Wing skins, including de-icer system
- Control surface skins
- Bomb bay doors
- Propeller spinners
- Waffle grid stiffeners
- Formers and air ducts
- Many airframe castings
- Nacelle skins
- Engine castings
- Wheels, brakes, gun turrets
- Radar, radio and fire control equipment

MAGNESIUM

Although it served the purpose at the time, there's nothing quite so obsolete as "yesterday's" airplane. Today's planes have the kind of "get-up-and-go" that really counts. The modern bomber carries heavier loads for greater distances at higher altitudes than ever before.

Magnesium, the world's lightest structural metal, has played a vital part in the progress of air transportation. Where 1,000 lbs. of this ultra light metal were used in the 1940 bomber—now 15,000 to 25,000 lbs. are used. Today it is found in almost every part of these planes in the form of sheet, castings, extrusions and forgings. By this extensive use of magnesium the weight of these planes is as much as three and one-half tons less than it would have been had other comparable metals been used throughout. A vital metal in air transportation today, magnesium offers even greater design improvements for tomorrow. If your aim is light weight, keep your eye on magnesium.

THE DOW CHEMICAL COMPANY
Magnesium Department • *Midland, Michigan*

New York • Boston • Philadelphia • Washington • Atlanta • Cleveland
Detroit • Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada

WHO'S WHERE

Changes

P. W. Carr, consulting engineer, has been named administrative assistant to the general manager of Wright Aeronautical Corp. . . . **Duncan B. Gardiner** has been designated assistant chief engineer for Vickers, Inc., division of the Sperry Corp. **Harold O. Flynn** has been appointed chief aviation engineer for the Chevrolet Aviation Engine division at Tonawanda, N. Y. . . . **N. A. Baird** has been promoted to assistant to vice president-engineering, Douglas Aircraft Co. **Howard Abeel** and **Harry Hjorth** have been appointed personal assistants to the vice president-military sales of Douglas. In other moves in the company, **O. B. (Benny) Marble** has been named advertising manager and **C. J. Miller,** assistant advertising manager.

Norman A. Duffany has been designated senior in aircraft technical sales and application engineering for the New York Air Brake Co., with headquarters in Watertown, N. Y. . . . **K. R. Duee, Jr.,** has been named aeronautical field engineering manager for Resistoflex Corp.'s aircraft hose assemblies and fittings.

John J. Shad has been made general sales manager and **Joseph W. Meyer** has been made general traffic manager of Chicago & Southern Air Lines.

RDB'S NEW CHAIRMAN

MIT chemical engineer and fuels and lubricants expert Walter Gordon Whitman has officially taken up his new post as civilian chairman of the Defense Department's Research and Development Board, succeeding William Webster. During World War II, Whitman simultaneously headed the basic chemicals division of the War Production Board and was chairman of NACA's subcommittee on aircraft fuels and lubricants. In 1948 he became a member of the Lexington Project of MIT, investigating nuclear power for aircraft. In 1950 he joined the fuels and lubricants committee of RDB.

INDUSTRY OBSERVER

►Air Materiel Command is disappointed with a proposed safety technique which provided for carrying all plane fuel in wing tanks which could be dropped as an emergency procedure to avoid fire hazard in forced landings. Investigation indicated that if the tanks were dropped during emergency landings they would follow a bomb trajectory, and the pilot, if he continued his landing in the same direction, would fly directly into the explosion of the fuel tanks. Some consideration is now being given to a plan for external tanks which would catapult away from the plane after crash landing.

►Navy's giant Martin Mars flying boats are steadily piling up a ton-mile cargo record in their run between the West Coast and Pearl Harbor that is causing some second looks at the future of the long-range flying boat as a carrier. Only flying boats the Navy now has on order for cargo work are the turboprop Convair R3Ys. As soon as the expected "bugs" are taken out of the prototype XP5Y-1's new powerplants and controls there will be some new seaplane cargo operational tests.

►Tipoff to the much higher horsepowers (over 10,000 hp.) expected from turboprop engines now in design stage is the anxiety which is being shown by powerplant and propeller engineers over developing various methods of attachment of the propeller to the engine, to replace the conventional shaft and spline arrangement now used. Bending moment on the shaft, plus the desirability of tucking controls inside, are spurring research into several possible solutions of the problem.

►Graviner Explosion Suppression System for aircraft fuel tanks (AVIATION WEEK June 11, p. 45), was recently successfully demonstrated in an F-84 wing section at Republic Aviation's Farmingdale, N. Y., plant. Incendiary machine gun bullets were fired through a wing section containing fuel and the suppression system effectively prevented an explosion. Device is marketed in the U. S. by Simmonds Aerocessories, Tarrytown, N. Y.

►Cessna Aircraft's No. 2 plant at Hutchinson, Kan., has received subcontracts from General Motors Corp., to make major components for the Republic F-84F sweptwing jet fighter, which GM is building under license at Kansas City, Kan.

►Ryan Aeronautical Co. is going into volume production on ceramic coatings for high temperature parts for jet and piston engines. Among orders so far are: 600 sets of exhaust systems for Pratt & Whitney R-2800s for Convair 240 and 340 planes; similar exhaust assemblies for Pratt & Whitney R-4360 engines for all Boeing B-50 bombers and C-97 Stratofreighters on order for the USAF; experimental orders from General Electric for ceramic coating of J-47 jet engine transition liners and inner combustion chambers; experimental work with Douglas Aircraft and United Air Lines on ceramic-coated exhaust stack assemblies for service test on R-2800s powering DC-6s; ceramic-coated sections on new manifolds for the Continental 825-hp. engine powering the General Patton medium tank. Also, replacement programs are going on using ceramic-coated exhaust systems for all the commercial Boeing Stratocruisers and most of the Convair 240s.

►Air Force now puts total flyaway cost for a Convair B-36 intercontinental bomber at $3.5 million, plus about $2 million for replacement parts for a year. Major portion of the replacement parts is for engines. A replacement of 101% is figured for the Pratt & Whitney R-4360 piston engines and a replacement of 89% for the General Electric J-47 jet pod engines.

►Despite heavy emphasis on B-47 jet bomber production, the program is moving slowly at the two Air Force plants which have been opened to supplement the original Boeing Wichita B-47 program. Air Force does not expect the first B-47 from the Lockheed license plant at Marietta, Ga., until March, 1953, and the first B-47 from the Douglas licensee plant at Tulsa until a month later.

Washington Roundup

Air Force-Army Fight?

Undercover inter-service rivalry between Air Force and Army is thickening.

Speculation on Capitol Hill is that the fight will break into the open before long.

Navy apparently on the sidelines, is seen by observers as spurring—or at least abetting—the Army.

The two key issues:

- **Control of tactical aviation.**
- **Price Navy and Army must pay for major Air Force build-up.**

Last year, after USAF fell short at first in filling the tactical air role in Korea, demands to turn ground support aviation over to the Army rose. House Armed Service Committee's chairman, Carl Vinson, announced an investigation. His aim was to get the services to work out ground-air cooperation between themselves. With the threat of a public investigation hanging overhead, it looked as though they would, and the investigation didn't come off.

But last week pressure for congressional hearings to settle the issue was building up again. Rep. Sterling Cole, who frequently speaks for the Navy, told the House:

"There can be no doubt that there is very definite inter-service antagonism and basic disagreement on this important problem, and the services have evidenced a clear inability to resolve the matter by themselves."

Cole declared:

- In World War II it took Army Air Forces three years to develop effective close air support for Army troops, due to "its concentration on and near-hypnotism with . . . air-to-air combat and the . . . heavy bombardment missions." Ever since unification, "aviation problems of the Army have been the stepchild of the Air Force."
- "The most sensible thing would be to return to the Army all matters relating to the close tactical air support of ground troops. . . . The only sensible alternative would be to assign to the Marine Corps this close air support mission for the Army."

The cost to the Army and Navy of a major build-up of USAF is due for an early examination at closed-door sessions of Senate Appropriations Committee on the $60-billion 1952 fiscal year budget.

Committee members want to slash Army and Navy funds—except, perhaps, funds for Naval Air—and give the savings later this year or early next year to USAF for expansion beyond its present 95-wing goal.

Commented Sen. Joseph O'Mahoney, chairman of the Appropriations Subcommittee on the Armed Services:

"Air mastery is essential to defense, but this defense cannot be maintained without a sound economy.

"Therefore our problem will be one of finding methods of cutting military expenditures for traditional operations in the Army and Navy which do not appear necessary in light of modern scientific advances which have given us an atomic weapon."

Washington Observers' Outlook

- A switch in the Joint Chiefs of Staff line-up of Army and Air Force versus Navy that military observers say has prevailed since unification is likely. Army and Navy will vote together. At the time for decision, in mid-October, Army and Navy will vote for relatively equal boosts in the goals of the three services. Or, if the Administration decides the achievement of goals can be postponed and clamps a low ceiling on the 1953 fiscal year budget, Army and Navy will go for relatively equal cuts for the three services.
- Army's only hope of retaining its co-equal status with USAF seems to be capture of the tactical air role.
- Navy's stake in the issue: Transfer of tactical air to the Army would mean continuance of three approximately co-equal services. Otherwise, the prospect is a dominant USAF—and minor Army and Navy arms.

New Navy Chiefs

Air lost headway, but apparently only on paper, in the reshuffle of the Navy's top command.

- A "battleship" admiral, William Fechteler, replaces an aviator, the late Adm. Forrest Sherman, in the top spot of Chief of Naval Operations. Fechteler's record of cooperation with Army and Air Force as commander in amphibious operations in the Pacific during the war was a strong point in his favor with the President. Also, he was the only leading candidate for the post who didn't figure in the B-36 investigation.
- An air admiral, Adm. D. B. Duncan, transfers from a third-level post, Deputy Chief for Naval Operations, to the second spot, vice chief.
- A "submarine" admiral, Vice Adm. James Fife, steps into the key spot of Deputy Chief for Operations.

Fechteler's first words after his selection: "The Navy without a top flight air arm is totally inadequate to the job the Navy has today. A concrete example of my attitude toward air is my selection for the post of Vice Chief of Naval Operations, Adm. Duncan, one of the foremost aviators in the Navy."

Army: First Line of Defense?

Army is making a bid for the role of "first line of defense," which, after World War II, went from Navy to Air Force.

Army's Chief of Staff, Gen. Lawton Collins, on the subject:

"The Army is no longer a second-line of defense that would have time to expand and train while our allies or the other branches of our armed services—Air Force and Navy—held an enemy at bay. It has been necessary to station American Army troops on the frontiers of democracy in Western Europe and other strategic areas of the world. They would most likely feel the first blow of an invader of the free world."

Collins also reports:

- **On helicopters:** "All requests for the Far East concerning helicopters have been primarily for one purpose: That is to get more of them. We have been able to fulfill only about 20% of this requirement."
- **On advance airheads:** "Exploitation of airheads—an advanced area seized by paratroop units—will play a greater part in combat operations in any future war than ever before. We are rapidly gaining the capability of air-landing additional divisions and heavy equipment following assault drops into an airhead, whereas in the past we have had to depend on extremely hazardous and costly glider operations for the initial build-up."

—Katherine Johnsen

AVIATION WEEK

VOL. 55, NO. 7

AUGUST 13, 1951

House Gets $15-Billion Air Power Budget

Slash in President's fund request is not likely to affect military aviation.

By Ben S. Lee

Prompt House action approving the largest U. S. peacetime military budget of all time was expected last week. The budget would allot nearly $15 billion out of 1952 fiscal year funds for purchase of aircraft and related materials.

Although the appropriation proposal, as recommended by the House Appropriations Committee, cuts the President's overall budget of over $57 billion by $1.5 billion, this is not expected to affect, materially, the plans of the military for aviation procurement. Before the slash, the armed services planned to spend for aircraft and related materials:

- **Air Force** $11,092,000,000
- **Navy** 3,549,476,000
- **Army** 51,661,000

Meanwhile, House Armed Services Committee chairman, Carl Vinson, declared in a press conference that he would ask for immediate hearings which would build the Air Force to 163 wings and give the Navy authorization to build two more super-carriers.

An immediate expansion for both services is imperative, he said, to America's defense. "If we are to have this force in time the decision to allocate the necessary resources must be made immediately, and the funds should be included in the next budget to be submitted to Congress."

▶**As Recommended**—Under the committee-recommended budget, Army is presently slated to receive $20,125,574,655; Navy, $15,552,143,225; and the Air Force, $19,854,128,000. This means a slash of $685,321,500 to the Army; $194,272,000, to the Navy and $647,015,000 to the Air Force.

The proposal, as recommended by the House Appropriations Committee calls for a total appropriation of $56,062,405,890. This does not include funds to finance U. S. effort in the Korean war.

Air Force, Navy and Army have indicated they expect to ask for additional funds in supplemental budgets to finance inflation costs. The Korean War Funds Bill will be presented to Congress at a later date.

This money, the committee said, should go far toward providing this nation with "the most powerful striking force ever placed in the hands of any nation." The committee, however, scored the services for what it termed wasteful manpower and procurement practices, and said that the fact that $2 billion out of every $10 billion appropriated for defense was to pay the cost of inflation made elimination of waste mandatory.

▶**Air Decisive**—Vinson's plan for a 163-wing USAF called for 138 combat wings and 25 troop carrier wings which would be used primarily for joint Army-Air Force operations. "It is impossible in modern warfare to postpone or avoid decisive action in the air. No matter how much strength we may be able to assemble on the ground or the sea, we cannot hope to defeat Soviet power unless we have superior strength in the air."

Existing aircraft plants could produce the extra planes needed to build to the 163-wing structure but he did not estimate what the cost of such an increase in size would be. He did say, however, that extra bases needed by the Air Force would require about $400 million.

Apparently the build-up called for by Vinson while favoring the Air Force is aimed at mollifying the Army demands for more emphasis on tactical aviation. Air Force had wanted a 75% increase to its present 95-wing structure, while Navy wanted to hold the Air Force to a 10% build-up and a greater emphasis on Naval aviation. Army had indicated that it would go along with a considerably heavier build-up of the USAF wing-structure providing that a major portion of that build-up was for tactical aviation for ground support needs.

Considerable opposition is expected to the Vinson proposal if the Korean war ends favorably for this nation. Estimates for the cost of even a 150-wing Air Force has been set at approximately $33 billion in 1953 fiscal funds and informed sources report that such a build-up could not possibly be achieved by year-end 1953 short of declaring an all-out mobilization. This would mean a defense budget of at least $60 billion next year.

▶**95 Wings**—General Hoyt S. Vandenberg, USAF Chief of Staff, told the committee that the funds requested in the USAF fiscal 1952 budget were committed to providing a 95-wing Air Force. But, he pointed out, that while the force is larger than that formerly considered adequate for normal years

FIRST SABRE AIR REFUELING PHOTO

First photo of the North American Aviation F-86E Sabre jet fighter in an aerial refueling operation shows the nose fuel inlet opened to receive a nozzle from the flying boom lowered by a Boeing KB-29P tanker. The planes were flying over the Mojave Desert near Edwards AFB, Muroc, Calif. Tests showed that the jet fighter could make banks and turns during the refueling attachment although straight and level flight is best.

of peace it cannot be considered adequate for full-scale war. "The Air Force," he said, "is now expanding from the low point of 48 wings of a year ago to the 95 wings that we hope to attain by end of fiscal year 1952."

Taken to task by Rep. George H. Mahon, chairman of the committee, for declaring before the Senate recently that the U. S. had only a "shoestring" Air Force, Gen. Vandenberg said, ". . . explosive situations prevailing in Iran, and Yugoslavia, to the uneasy situation that prevails all along the Soviet periphery . . . singly and collectively represent possible further charges, as Korea has been, upon U. S. air power. And, to the extent that these peripheral situations draw off our air strength, they could involve a steady subtraction of the means presently at our disposal for meeting one day a possible direct blow from the main enemy."

"But we have only so much air power—the amount that can now be detached and spread around the globe is painfully limited—and, if we, in the future, should be called upon to risk continued attrition of our present air assets in a series of Korea-type peripheral actions across the earth, our resources for performing the main job are weakened," was General Vandenberg's reply.

► **The Plan Before**—Here is how the armed services planned their aircraft expenditures before the Appropriations Committee recommended its $1.5-billion slash of funds for the 1952 fiscal year.

AIR FORCE

• **Complete aircraft.** Funds requested in the fiscal 1952 budget include $4,957,360,000 for 8,690 complete aircraft. Of that amount and number, $1,514,966,441 is requested to complete payment for 3,092 planes ordered out of fiscal '51 Fourth Supplemental funds. Last January, a general stepup in the military program was ordered and the Air Force made a down payment amounting to about 10% on the 3,092 aircraft, with authority to complete payment out of '52 funds.

Air Force budget requests from fiscal 1952 funds include a basic $3,442,393,559 for the purchase of 5,604 aircraft which will complete the presently programmed buildup to the 95-wing structure.

• **Spares.** Fiscal '52 budget requests would allocate $4,197,035,000 to initial component spares and spare parts—a sum almost equal to that set aside for complete aircraft procurement.

Brig. Gen. Horace A. Shepard told the Appropriations Committee that the sum includes initial spare components and spare parts required for the operation of procured aircraft for the first year. This includes all major components such as airframes, engines, electronics, armament propellers, etc., in sufficient quantity to establish the basic stock levels, set up distribution pipelines and modification kits, he said.

Spare engines, however, Shepard pointed out, are procured for the entire life of the aircraft. Because of this, he said, aircraft engines call for about 40% of the entire funds requested under spares and an additional 20% for spare engine parts. This is a total of 60% of funds requested for spares.

• **Equipment and facilities.** Air Force wants $1,109,497,000 authorized for building industrial machinery, equipment and facilities. "This provides money for expansion of industrial machinery and plant capacity necessary to produce the aircraft for the accelerated Air Force buildup to a 95-wing level," Shepard said.

A minimum payment was made out of 1951 Fourth Supplemental funds to start building new facilities, etc. and the balance of $564,498,000 was deferred until fiscal 1952, Shepard said. In addition, continued expansion, to provide the 95-wing structure calls for $544,999,000 to complete that expansion, he explained.

• **Guided missiles.** The Air Force requests $130 million in fiscal 1952 for the procurement of five types of guided missiles.

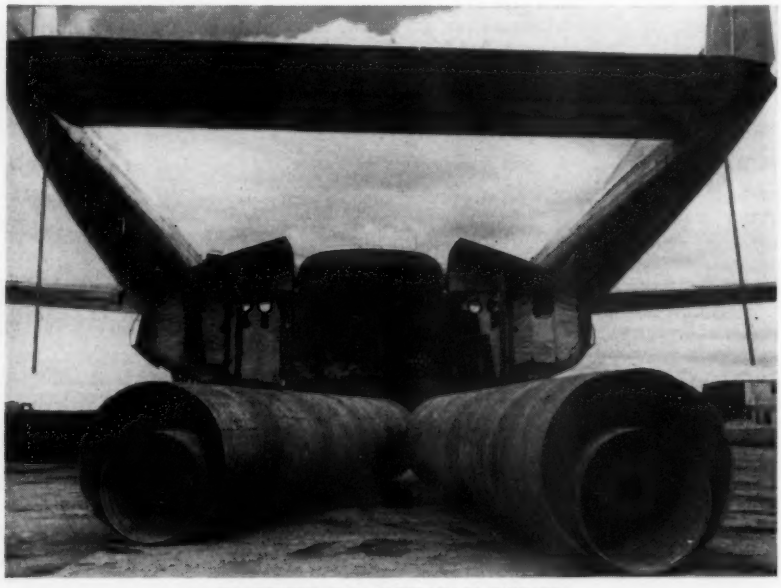
According to the Air Force, the funds will provide a minimum number of missiles and supporting equipment to continue an operational guided missiles program. Of the total amount set aside for missiles procurement, approximately 79% is requested for complete missiles and the necessary auxiliary equipment.

NAVY

The Navy Department fiscal year 1952 budget calls for $4,497,869,000 for its Bureau of Aeronautics aircraft procurement program. Of this amount, $3,572,476,000 is for new aircraft and related procurement and $925,393,000 is for operating programs, including research and development. In addition, Navy has requested $450 million to finance prior aircraft procurement authorizations committed under fiscal 1951, Fourth Supplemental budgets.

Rear Adm. Thomas S. Combs, Chief, Bureau of Aeronautics, told the committee that Naval aviation funds were figured on a very conservative schedule. "We are requesting funds to procure aircraft, which will be delivered by December, 1953," Combs said, "but our estimate falls short of modernizing all of the approved forces."

"We believe, however, that any decision on the procurement of additional aircraft should be deferred until combat and production experience under existing programs can be more adequately evaluated," Combs said. The contemplated budget represents a "calculated risk we are taking in order to insure that the aircraft which ultimately are ordered to modernize these forces will represent the most modern and most effective types available."



PACKET ON CIVILIAN DUTY

This Fairchild C-119 Packet, on loan from the USAF to the Iron Ore Co. of Canada to provide the necessary airlift in development of an iron ore mining project deemed essential to defense, is seen being loaded with 25-ft. lengths of culvert pipe for delivery to the mining area. The ship is handled by civilian personnel of Fairchild. In 49 flying days, the Packet has hauled 1,452,120 lb. and traveled 39,920 mi.

• **Complete aircraft.** The Navy request for $3,426,854,000 for aircraft procurement represents a 13% increase over corresponding estimates for 1951. This contemplates the purchase of approximately 3,700 aircraft. Besides this number, approximately 500 were purchased out of fiscal 1951 Fourth Supplemental funds for which only a down payment was made. Included in the total 3.4 billion is $450 million requested for fiscal '52 procurement to liquidate prior contract authority, the Navy said.

• **Ordnance for aircraft.** Navy in fiscal 1952 asks a total of $49,056,000 for aircraft ordnance and related procurement. Proposed Naval procurement of ordnance and spares is lumped together. Adm. Combs told the committee that it was far more economical for Navy to purchase complete spares of gun parts, weapons and fire control apparatus at the same time as initial procurement. "We have found," he said, that if we make them [gun parts] in small quantities over a long period of time, it is much more expensive than to make these parts and get them while they are making guns."

Navy carries procurement of spare parts under "operation of aircraft" and requests $127,628,000. However, $23,031,000 originally programmed in the 1952 budget to cover additional purchase of engine spares and parts has been withdrawn pending further evaluation.

Varying sums for spares and parts for Navy, Marine Corps, and Naval Air Reserve components listed in detail in the overall budget requests round out Navy's total spares needed during the coming fiscal year to approximately $3.2 billion. This amount is almost equal to that requested for complete aircraft procurement.

• **Guided missiles.** Navy asks $33,425,000 for procurement of complete guided missiles and supporting equipment. Of this amount, $16.5 million is allocated to guided missile procurement and $16,925,000 is allocated for target drone equipment.

Vice Adm. John H. Cassady, Vice-Chief of Naval Operations for Air, told the committee that guided missiles, as such, had not yet reached combat. "They are moving from research and development stage into the initial stages of production test and evaluation," Cassady said.

ARMY

Although only $44,239,000 is requested in basic 1952 budget appropriations for aircraft, Army's program is diversified and indicates a continued aim at obtaining a larger tactical aviation corps for itself.

A major portion—approximately $20 million—of Army aircraft funds goes to helicopters. In numbers of planes however, fixed-wing airplanes still leads with approximately $17.5 million allocated for their purchase. The remaining $6.8 million requested by Army is for the purchase of small aerial target planes with speeds varying from 200-400 mph.

Of the helicopter, Maj. Gen. E. L. Ford, chief of Ordnance said: "Helicopters are playing an increasingly important part (in tactical operations) and we feel it will continue to do so in our operations in the future." . . . "The helicopter has been used extensively in Korea to cover the evacuation of the wounded, to supply isolated units; and in addition, to move personnel in small numbers from one location to another in places inaccessible due to terrain or enemy action."

Because major overhaul of Army aircraft is a responsibility of the Air Force only a relatively small sum of $7,422,000 is requested by Army for aircraft maintenance. This sum is primarily for the "replenishment of spare parts and material funds for necessary field maintenance both in the U. S. and overseas," it was said.

• **Guided missiles.** Breakdown of funds for procurement of complete guided missiles by the Army is not detailed, although a total of $242 million for research and development activities mainly in the field of guided missiles is asked.

Maj. Gen. Ward Maris, Chief Army Research and Development declared that the $242 million requested by Army represented a $57-million increase over that of 1951 and a $186-million increase over that of 1950.

Super Connie Orders Climb to 143

Air France has ordered 10 Lockheed Super Constellation 1049Cs with Wright 3350 compound engines, for $15 million. This, plus the recent order for three Super Connies by Pakistan International hikes Lockheed's commercial backlog of Supers to 62, priced at $96,041,000. Meanwhile, Trans World Airlines, with 10 already on order, is negotiating with Lockheed for still more.

The military have at least 81 Super Connies on order, 10 for Air Force and 71 for Navy. This makes Lockheed's total Super Connies backlog at least 143 planes costing nearly $250 million.

Lockheed flew the first production model recently. First deliveries go to Eastern Air Lines. Delivery on the first of Air France's ten supers will be taken about March, 1953.

Air France is considering seating 64 passengers in the Supers for trans-Atlantic service. Present Air France Constellations carry only 34 passengers. All the 23 standard Connies have been converted by Air France to low-density, luxury service on the trans-Atlantic runs.

Lockheed president Robert E. Gross says "present contracts will keep Lockheed busy on Super Constellations through 1953. That will give us a record of more than 10 years without a single shutdown of the transport assembly line, and the end is not in sight."

Lockheed has designed the Super Constellation for long haul of from 47 to 93 passengers (commercial) and up to 110 (military).

Lockheed 1049 Orders

(As of Aug. 1)

U. S. AIRLINES:	
Eastern Air Lines	30
Trans World Airlines	10*
FOREIGN AIRLINES:	
Air France	10
KLM Royal Dutch Airlines	9
Pakistan International	3
Airline total	62
U. S. Navy	71
U. S. Air Force	10
TOTAL BACKLOG	143

*TWA negotiating for more.

NMB Asks End Of WAL Strike

Los Angeles—National headquarters of the National Mediation Board last week stepped into the strike of 300 AFL Air Carrier Mechanics Assn. members against Western Air Lines, urgently requesting the strikers to end their walkout.

In telegrams from Executive Secretary Thomas B. Bickers to both the airline and the striking union, the board stated it did not consider the differences between union and company such as to justify continuation of the strike.

The striking mechanics in a telegram to Bickers dropped their demand for a union shop and dues checkoff.

But they still insisted on making their five-cent retroactive raise effective to Jan. 1 instead of Apr. 1 (offered by the company). This cost difference is small; casino owners at Las Vegas and Reno reportedly offered to meet the cost themselves to get their customers aboard the downed WAL planes. Mechanics also want a cost-of-living escalator clause, to be mediated.

Western officials said they were ready to resume operations upon return to service of striking mechanics and of employes refusing to cross the picket lines. The airline offered to resubmit the case to mediation through Federal Mediator James Haloren as soon as normal operations were resumed.

The mechanics said they would go back to work and resume mediation if the company would commit itself to arbitration on issues unsettled after 15 more days' mediation. But the company remained adamant against any prior commitment to arbitrate.

Meanwhile, furlough orders affecting more than 450 Western clerical, ticket office and airport personnel went into effect for the duration of the strike. With 300 mechanics on strike and 180 pilots and 100 stewardesses refusing to cross picket lines, more than 1,000 members of Western's normal staff were idled by the walkout, first in Western's 25 years of operation.

New McDonnell F3H In First Test Flight

A new needle-nosed, sweptwing Navy McDonnell jet fighter rolled down the runway at Lambert St. Louis Airport last week and climbed steadily into the air to begin its first flight—of 25 minutes duration. Chief Test Pilot Bob Edholm, who has done much of the flight test work on other high-speed McDonnell jets was at the controls.

Confidence of McDonnell and Navy in the new airplane and its ability to operate in normal air fields was indicated by the fact that it took off for the first time at its home base, instead of going to Edwards AFB, at Muroc, the usual first jumping off place of recent high speed jets.

McDonnell calls the new F3H, the Demon, in line with its other "spirit world" jet plane names, Phantom, Banshee and Voodoo.

The Demon is powered with a single Westinghouse engine, the new J-40, rated in some quarters in the 8,000-to-9-000-lb.-thrust power bracket.

It has twin-flush air inlets just behind the nose in the fuselage but forward of the wing leading edge. Sweepback of the wing appears comparable to the 35-degree sweep of the XF-88 Voodoo. Wing and tail surfaces are similarly swept.

Plane sits nose high on its tricycle gear and, in general appearance, may be mistaken by some aircraft spotters for the Douglas D558-II Skyrocket.

Developed by a manufacturer who already has produced one plane credited with speeds around the 700-mph. mark (the XF-88), the new Demon makes a promising addition to the Navy's growing stable of new high-speed jets which includes such other radical craft as the Grumman's XF10F-1, Douglas XF4D, and the Chance Vought F7U now emerging into production status.

CAB Looks Into MWA Stock Buy

A deal for Purdue University to buy control of Mid-West Airlines for $64,000 is up for Civil Aeronautics Board hearings, consolidated with the Mid-West certificate renewal case. Purdue and Mid-West signed a contract under which Purdue would buy MWA's secured convertible 6% notes Series A for $64,000.

Mid-West's certificate ran out June 24, but the company continues to fly, pending CAB disposition of the case.

Purdue and Mid-West had hoped to conclude their deal by July 25 under special exemption without waiting for special hearings. But CAB ordered the purchase proposal consolidated with the renewal case.

Purdue Research Foundation president, Grove Webster, says the university has arranged a credit of about $1 million for new equipment and working capital. MWA now operates six single-engined Cessna 190s. Route extensions to Chicago, Denver and Fargo are asked of CAB. Purdue President F. L. Hovde is tentatively slated to become Mid-West board chairman.

Webster says the research foundation plans to buy the debentures and the control that goes with them as an investment only. The airline would not be subjected to any interference for purposes of university student education, although the airline might be handy for "postgraduate investigation for master's degrees."

Extra Man-Hours

Ryan Aeronautical Corp., San Diego, Calif., estimates it has obtained 236,000 extra man-hours through use of subcontractors since the start of Korean hostilities.

Rex Dempsey has been made supervisor of outside production. Bulk of Ryan's 35 subs are in the San Diego area, but some are in the Los Angeles area, in Ohio, and as far away as Pennsylvania and New York.

The work ranges from large, specialized operations such as stretch-forming of C-97 fuselage skins to making small dies for jet engine parts.

SPECIAL TREATMENT FOR B-36 STABILIZER

This extra-long truck trailer was specially built for the job of transporting Convair B-36 horizontal stabilizers from the Dallas plant of Tex-Lite, Convair subcontractor, to the assembly line at Ft. Worth. The custom-built vehicle measures over 91 ft. from bumper to bumper. Legal truck-length limit in Texas is 45 ft., so special permission had to be obtained. Trip cost via truck is $75; by train over $725.

Overseas Air Coach Parley Asked

The Civil Aeronautics Board has asked Pan American World Airways and Trans World Airlines to call a special meeting of North Atlantic carriers of the International Air Transport Assn. to rewrite the air coach fare resolution omitting any limit on number of coach trips and fixing seating density at the "average maximum operating capacity" of each type plane. The suggested New York-London fare is between $225-$250.

▸**Sound Service Urged**—In its letter to PAA and TWA the Board says: "The Board re-affirms its advocacy of a sound trans-Atlantic tourist service and urges that every effort be made to obtain agreement on such a service to begin in the spring of 1952."

As a result of the CAB action, the international airlines must agree on a new group of resolutions satisfactory to CAB fast or there will be an open rate situation on the North Atlantic after Sept. 30.

The Board's disapproval can nullify an international airline agreement, even though it was the airlines of the individual nations who made it.

In this case, the Board disapproved mainly the 4 trips-a-month limit on air coach service.

But terms of the Bermuda agreements tied that tourist resolution in with all the rest, in a so-called interlock agreement. In disapproving the tourist-fare resolution effective October 1952, CAB automatically nullified the whole set of resolutions including this year's regular-fare and off-season tourist agreement.

▸**CAB Objection**—CAB favors starting air coach the year round on the North Atlantic; and CAB Commercial Rate Section chief Louis Sissman says CAB even hoped coach service would begin before the October, 1952, date agreed to by the IATA conference. But, after study, the Board decided those terms of the resolution were too restrictive in one category, too vague in others.

Here are CAB objections:

• **Interlocking unfair.** CAB says the interlocking of the deferred tourist fare program for late next year with the North Atlantic fare agreements for 1951-1952 "improperly restricts" separate consideration of each.

• **Capacity limit.** CAB says the limit of only four air coach roundtrips a week for each trans-Atlantic carrier is contrary to the Bermuda Principles of 1946. The U.S. opposes capacity quotas set in advance on international air service agreements. This is based on the same principle as U.S. antagonism toward import quotas on commodities.

• **Seating density.** CAB says the agreement should set the seating density required on air coach service. Otherwise the Board feels there's no guarantee the service will pay for itself. In the May agreement, the carriers planned an ad hoc committee to decide this question at a later date. CAB wants the seating density set right in the resolution, specifically giving minimum number of seats for each type of transport.

▸**BOAC Fears**—It may be hard to convince BOAC to allow unlimited frequency of air coach on the North Atlantic. Main reason is that BOAC is running pretty close to capacity in the peak summer months now and doesn't have the capacity available to capitalize on additional traffic that coach fares next summer would be sure to generate, London observers say. But reports are that the British government itself favors early development of air coach, to reach the mass transportation market and especially to boost American tourist travel in British pound areas.

So the carriers may get together on something like the terms CAB asks PanAm and TWA to propose for agreement by the foreign flag carriers. CAB in its letter to PanAm and TWA says that if it proves impossible to get a resolution on starting tourist service by next spring, it should be started by spring of 1953 at the latest. This is a likely compromise to win agreement on unlimited number of trips.

North Atlantic Fare Structure

New York-London

IATA RESOLUTION EFFECTIVE DATES	ONE WAY	ROUND-TRIP
Up to 4/3/48:		
Standard	$325	$586.70
4/3/48-3/22/50:		
Standard	350	630.00
30-day, 10/48-4/49	...	466.70
60-day, 10/49-4/50	...	466.70
3/22/50-11/1/50:		
Standard	350	630.00
On-off-season	...	548.40
Off-season	...	466.70
Off-season, 15-day	...	385.00
11/1/50-9/30/51:		
Standard	375	675.00
On-off-season	...	587.50
Off-season	...	500.00
Off-season, 15-day	...	412.50

NOTES: Off-season period is Sept. 1-Mar. 31 eastbound and Dec. 1-June 30 westbound.

Off-season, 15-day rate is effective Jan. 1-Mar. 31 each year.

SOURCE: *CAB Commercial Rate Section.*

Government Aid Asked for Copters

Government encouragement of further helicopter development by five agencies: the Department of Defense, Post Office Department, CAA, CAB, and National Advisory Committee for Aeronautics, is called for in a report approved by the Air Coordinating Committee on the future of helicopters.

The report was prepared by a working group headed by Richard K. Waldo, CAA, and including representatives from the armed services and CAA.

The recommendations for government aid are:

• **Post Office**—Continued use of helicopters in handling terminal mail in Los Angeles and Chicago areas and in such additional areas as CAB certificates for helicopter service in the future.

• **CAB**—Continued encouragement of present metropolitan area helicopter services, and authorization of similar services in other areas as required by public convenience and necessity. Further study of the probable impact of the multi-engine transport helicopter in air travel, in connection with future route patterns and certification proceedings.

• **CAA**—Continued collaboration with CAB in sympathetic and promotional approach to helicopter civil air regulations; early provision for appropriations for testing and simulated airline operation of transport helicopters, together with study of the helicopter's military operational experience; drafting of specifications by the technical sub-committee of the CAA Prototype Aircraft Advisory Committee for one or more advanced design transport helicopters; study of helicopter requirements for communications, control, navigation and landing aid facilities, and heliports; provisions for heliports in the Federal airport program as needed, and advisory assistance to communities on heliport construction and operation.

• **Department of Defense**—Arrangement to permit purchase of limited number of transport helicopters for prototype testing and simulated airline operation followed by actual commercial operations; loan to CAA or its designated contractors of a limited number of helicopters for testing and simulated airline operation.

• **NACA**—More emphasis on basic rotary-wing research in such subjects as stability, fatigue, blade sections, anti-icing, instrument flight, drag and power requirements of compound helicopters, and investigation of design parameters for higher speeds.

The report says that midtown or close-in heliports are essential for successful helicopter operations, and calls for proper planning to assure such landing areas will be available.

Military Jets to Vie In National Air Races

An attempt to crack the world speed record for a closed course will be made by a North American F-86E Sabre jet over a 100-kilometer course as the climax of the two-day National Air Races at Detroit Aug. 19. Great Britain now holds the record.

Ability of the Sabre to turn tightly on the closed course at Detroit's Wayne County Airport will probably decide whether the USAF pilot flying the plane can better the 604.87 mph. record which John Derry, flying a de Havilland 108 jet plane set Apr. 12, 1948. An earlier F-86A Sabre piloted by Maj. R. L. Johnson, at Edwards AFB, Calif. set the world's straightaway speed record, Sept. 15, 1948, at 670.58 mph., a record which still stands.

The closed-course time trial will carry the sponsorship of Thompson Products, Inc., Cleveland, in perpetuation of the Thompson Trophy Race tradition of previous National Air Races.

▶ **Midget Races**—Military jet competitions will highlight the two days of military and civilian flying, but a series of midget plane races for the Continental Motor Trophy will bring a scramble of 25 race pilots into competition for the $25,000 prize money, for planes with 190-cu. in. piston displacement (approximately 90 hp.).

Special flight shows by the Navy Saturday and the Air Force Sunday, will precede the racing schedules.

Eliminations for the continental races will start Friday afternoon, semi-final races will be run Saturday afternoon and the finals Sunday.

▶ **For Bendix Trophy**—A Bendix Trophy 2,000-mi. cross-country dash from Edwards AFB, Calif., to Detroit Saturday will include six competing planes, three North American B-45 four-jet Tornado bombers and three Republic F-84E Thunderjet fighter bombers. The planes will represent the Air Proving Ground, Strategic Air Command and Tactical Air Command.

From other Republic M-84Es will compete in an Allison speed dash from Detroit to Chicago and return, two from SAC and two from TAC.

Another North American F-86E speed dash will be a short-range Chicago-to-Detroit race, with four planes participating.

Other Air Force flight demonstrations will include: the first public aerial refueling demonstrations involving two jet fighters newly adapted for in-flight refueling, the North American F-86E (see picture on p. 13) and the Republic F-84G (pictured in AVIATION WEEK June 18, p. 15). Refueling will be accomplished by Boeing tankers using the flying-boom refueling system.

Safety Record

Last year set a 13-year record for passenger safety on U. S. scheduled airlines.

The 1950 passenger fatality rate was 1.1 per 100 million domestic passenger miles. A new summary of comparative safety statistics in domestic scheduled airline operations, issued by Civil Aeronautics Board, shows the following rates for previous years:

1938....	4.5	1944....	2.2
1939....	1.2	1945....	2.2
1940....	3.0	1946....	1.2
1941....	2.3	1947....	3.2
1942....	3.7	1948....	1.3
1943....	1.3	1949....	1.3

Navy flight show will all be flown by Naval Reserve pilots. Only competitive event will be a rate-of-climb competition between a Grumman F8F Bearcat piston-engine plane and a McDonnell F2H Banshee, similar to that held in the 1949 Cleveland Air Races. There will be none of the Navy aerobatics which have featured previous races, Navy officials announced last week.

Large static displays of current USAF and Navy plane types drawn up at the airport will be an extra crowd attraction. Navy will exhibit some 18 different types of planes and helicopters plus six guided missile types. USAF will have approximately 20 plane types and some missiles.

Success of the Detroit races is being closely watched in the aircraft industry and by federal aviation agencies. Safety precautions taken following the tragic crash in the 1949 Thompson Trophy Race at Cleveland will be up for a severe test. Any additional serious accidents this year can well mean a finale to the National Air Races.

Convair Flying Boat May Have Big Role

New emphasis on the Navy's four-engine Convair turboprop flying boat in forthcoming procurement programs for fiscal 1952 and 1953 points to the probability of a re-appraisal of the long-range craft as a likely striking weapon and possible atomic bomb carrier.

First notice of sizeable procurement of the rangy, slim-hulled seaplane comes from Navy testimony in Congress indicating a first production order for 12 of the turboprop planes is scheduled in 1952 funds. This is in addition to the two experimental XP5Y-1 planes which the manufacturer is now completing at San Diego.

Navy testimony did not name the plane under discussion as the Convair XP5Y-1 or R3Y nor would Navy confirm that either was the type discussed, but testimony as to cost and size made it virtually certain that this was the aircraft being described.

▶ **Match for B-36?**—Some ardent Navy advocates say the turboprop flying boat, besides having the flexibility of water-based operation will do anything the Air Force's big B-36 intercontinental bomber will, and faster.

While costs of the first two airplanes have not been disclosed, Navy testimony in Congress shows that the first 12 production planes will cost $6,967,900 each or a total of $83.6 million.

Questioned by Congress, Rear Adm. T. S. Combs, Chief of the Navy Bureau of Aeronautics said that the per-plane cost would drop "if we put in an additional order," probably to less than $2 million and, perhaps, as low as $1.5 million.

Price differential between the first production order and subsequent major procurement is attributed to production engineering and tooling included in the price tag of the first two planes. "The next order of this same type aircraft which we plan for the 1953 budget will show a very marked drop," another official witness declared, "because these preliminary costs will already have been absorbed in this program."

▶ **Assignment Change**—The Convair flying boat was originally designated XP5Y-1 and then redesignated R3Y-1 when Navy decided last year to ask for production of the plane as a transport type rather than in its previously planned role of long-range patrol bomber. One report is that the re-assignment was made to forestall any inter-service bickering as to formally prescribed "roles and missions" of USAF and Navy until the big plane was in production.

The flying boat is powered by four Allison T-40 turboprop engines, originally rated at 5,500-shaft horsepower each driving 15 ft. six-bladed Aeroproducts propellers. Latest estimates are that a more advanced version of the T-40 develops approximately 7,500 shf. which would considerably step up performance of the present aircraft. Wing span is 146 ft. and length is 130 ft. Range is approximately 5,000 mi. and maximum speed is rated at 390 mph. with the original engines. The plane carries a crew of 12.

Another indication of the greater emphasis on big flying boats in Navy future planning is the development of the new amphibious and self-propelled beaching gear, to simplify handling of such craft, engineered for the Navy by Edo Corp (AVIATION WEEK Aug. 7, p. 32).

WHY SODIUM COOLED VALVES LAST LONGER

FIG. 1

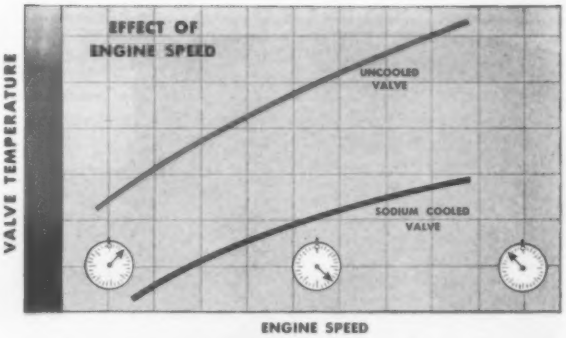
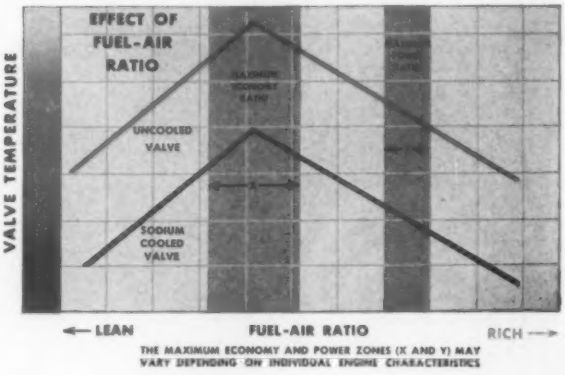


FIG. 2



THE MAXIMUM ECONOMY AND POWER ZONES (X AND Y) MAY VARY DEPENDING ON INDIVIDUAL ENGINE CHARACTERISTICS

The trend in modern engine operation is toward higher speeds and more economical fuel-air ratios, resulting in higher temperatures for many operating parts.

Higher temperatures of exhaust valves, for instance, are the dominant factor limiting valve life, sharply reducing the valve material's resistance to corrosion and distortion, and definitely limiting its life under fatigue conditions. Reducing valve temperatures, therefore, lengthens valve life amazingly; this is best accomplished by internal cooling as shown in the accompanying graphs based on recorded test data.

Fig. I shows effect of internal cooling of valve over the engine speed range. Fig. II shows lower valve temperatures of the sodium cooled valve for various air-fuel ratios.

Eaton engineers will be glad to work with you in applying the benefits of sodium cooled valves to your engines.

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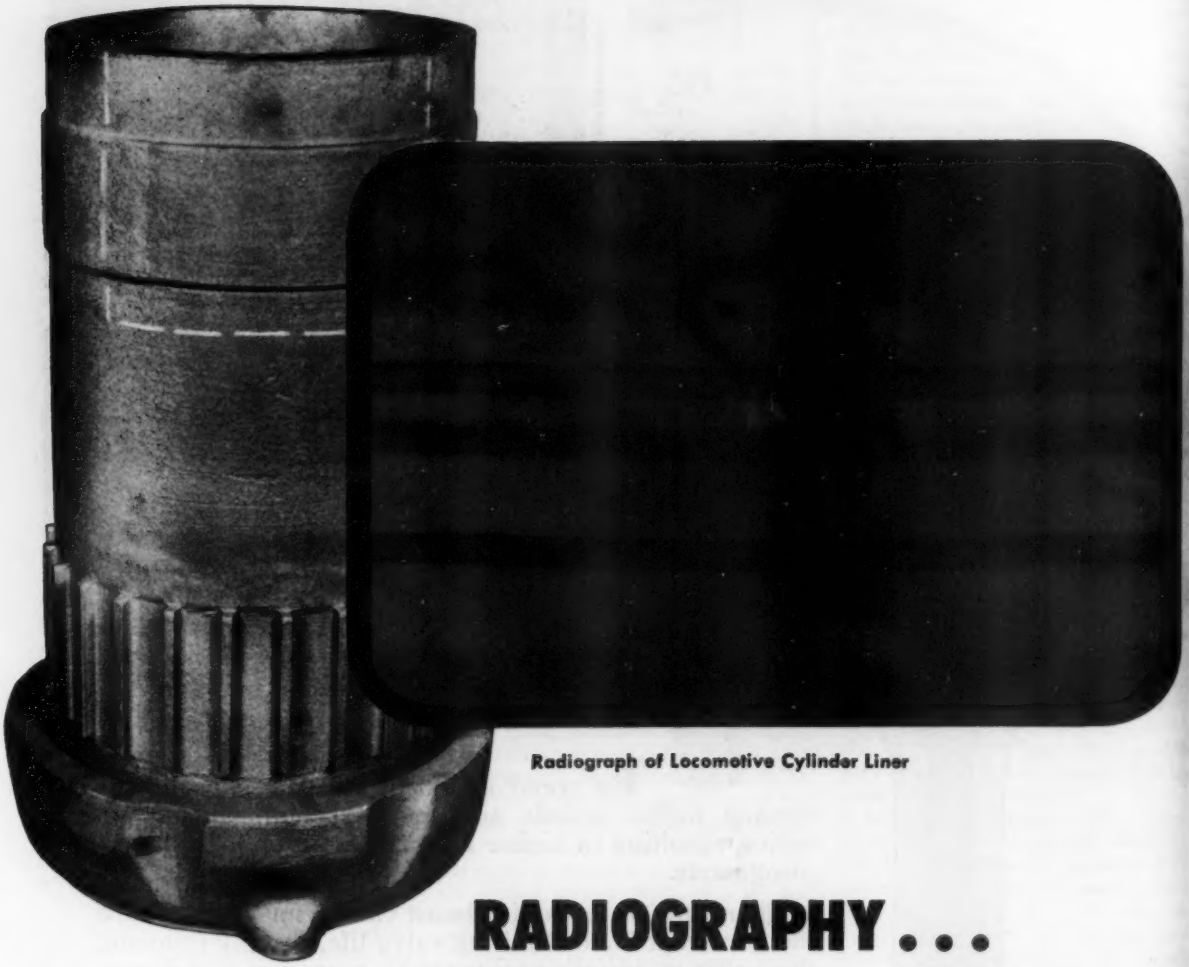

Radiograph of Locomotive Cylinder Liner

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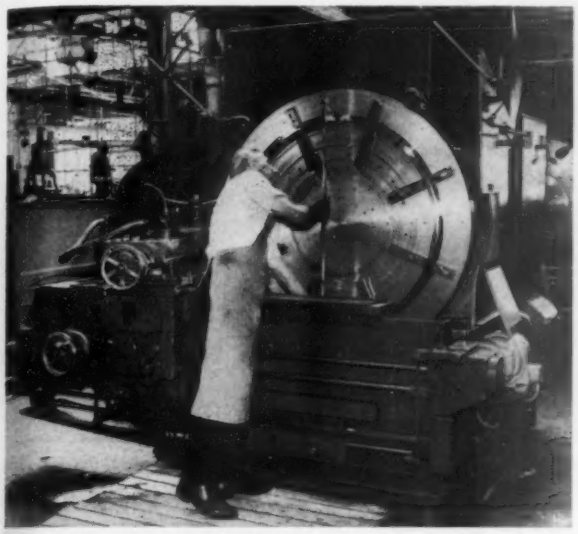
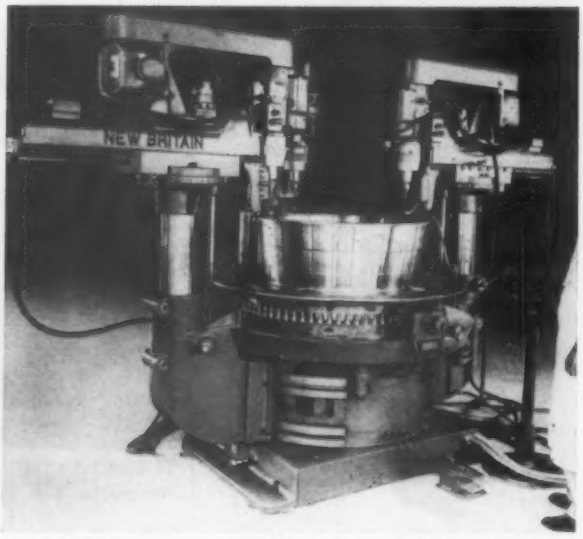


NEW LATHE with right-angle chuck and T-bed has 60-in. swing and sensitivity for light cuts on large thin-wall ring. Operator can get close for measurements.



THREE-HEAD drilling machine drills, reams, countersinks with one setup. Hole pattern changeover is rapid, dull drills easily spotted, expensive jigs eliminated.

Tool Flexibility Raises Jet Engine Output

P&WA meets medium production rate needs with new machines.

Production engineering refinements at Pratt & Whitney Aircraft have introduced several new types of machines for more flexibility in the fabrication of axial-flow jet engines.

These tools, generally, are tailored for a medium production rate in combination with an engine design status that contemplates progressive changes up until the design is frozen.

Flexibility of the machines is such that they will be useful for special jobs and in development of new engine models even when single-purpose tools are justified by a higher level of production.

Four of the new types were developed specifically through collaboration of P&WA production engineers with machinery builders. Another is a modification of two existing machines for better adaption to P&WA's manufacturing scheme.

COMBINATION lathe and internal grinder allows second operation such as recessing and chamfering after grinding job for saving in setup time and better accuracy.

▸**T-Bed Lathe**—P&WA engineers didn't want to use the high-horsepower, 60-in.-swing, heavy-duty lathe for machining shallow thin-wall stainless steel rings used in nozzle vane assemblies, blade shrouds and tailpipes. These rings, running as high as 48-in. in diameter, take relatively light and precise cuts, and for this work, the tooling men wanted the capacity of a large car-wheel lathe with the sensitivity of a tool-room unit.

Consultation with Lodge & Shipley resulted in a special, right-angle, chucking lathe with a T-shaped bed, with the section mounting the carriage at 90 deg. to the lathe centerline. The carriage is fitted with a cross-slide which can move parallel or at right angles to the centerline so that the machine can handle facing, straight or taper turning, or boring.

The tool uses a 25-in. heavy-duty headstock with 11½-in. hole for chucking pieces with a shaft or other extension. Bulk of the parts to be made are fastened to the 54-in.-diameter aluminum faceplate with clamps and rods,

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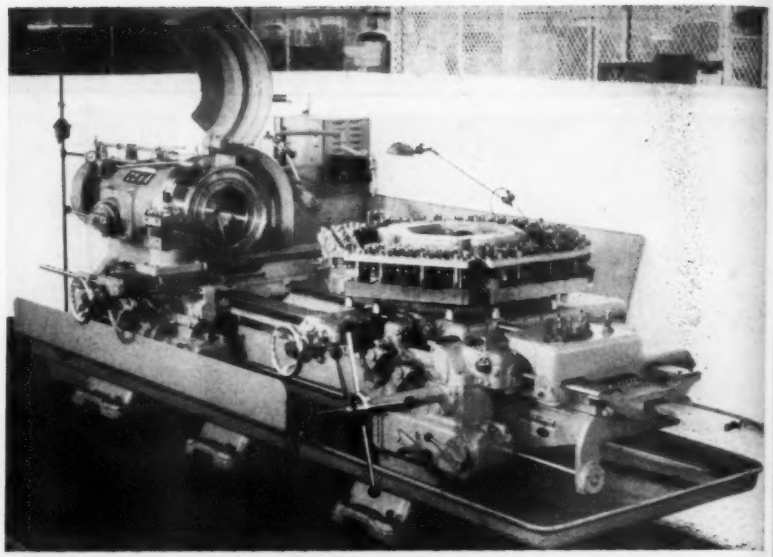


TURRET LATHE embodying extra rigidity for easy machining of tough alloys for disks incorporates large tool-holding capacity of early Harkness design.

or by chuck jaws which are bolted to the plate.

Low moment of inertia of the plate gives easy stopping and starting. Sensitive controls permit tolerances up to .001 in. There are 25 spindle speeds (4 to 225 rpm.) and 55 feed speeds (.001 to .0064 in./rev.).

Loading and unloading are easier than on standard lathes, P&WA says, because of the absence of the long bed extending beyond the workpiece. And the operator can stand much closer to the work to watch cutting and make measurements.

Another benefit is the saving in floor space—nearly half that occupied by a standard 60-in.-swing lathe. And cost is several thousand dollars less than that of comparable 60-in. lathes on the market, the company reports.

The unit is well suited as a second-operation machine to receive roughed-out work from a vertical boring mill and several of the units teamed with the latter make an "ideal" production team, says P&WA.

Five of the new machines already are installed and Lodge & Shipley is supplying them to other industries, as well.

► **Three-Head Driller**—There is a large variety of drilling patterns in the company's fabrication of axial-flow jets, spread over diameters up to 48 in. and in some instances involving as many as 196 holes.

Multi-spindle drilling machines weren't considered practical for the work, because the volume of production did not justify the outlay for such specialized machines, capable of handling the entire range of patterns.

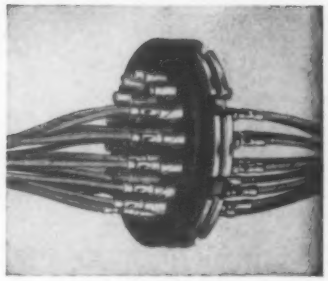
Loss in drill changing time was another factor. Also, because stainless steel and other gas turbine materials tend to work harden at an alarming rate when the tool doesn't cut freely, P&WA says that with a multi-spindle machine it would be very easy to ruin a set of drills and several components before a dull drill was discovered by the operator.

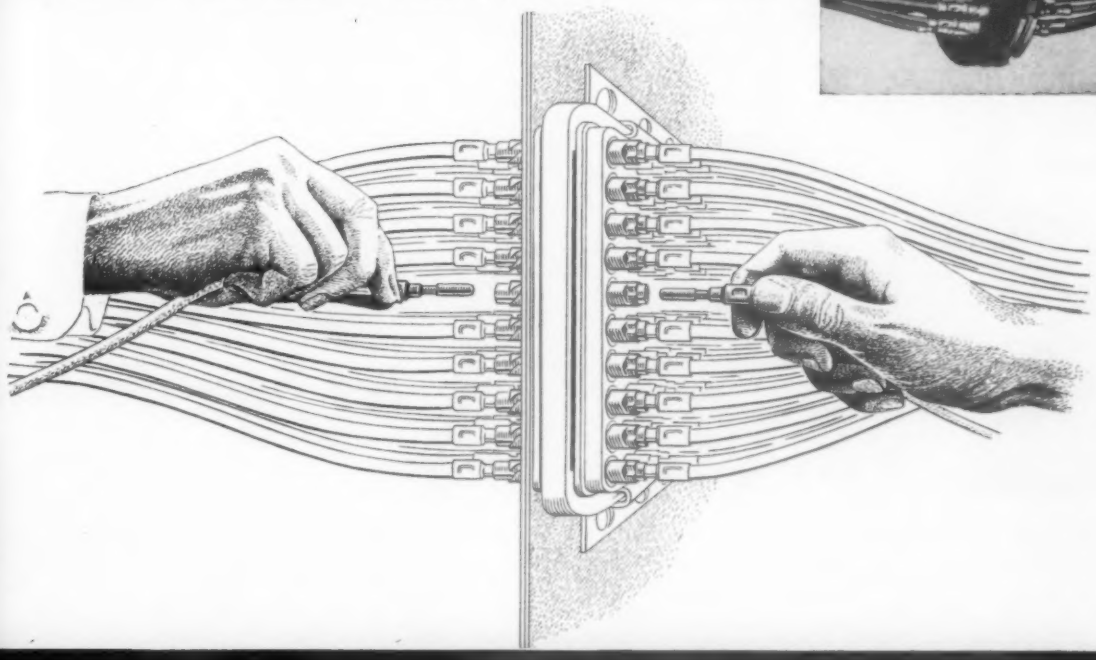
VERTICAL BROACH has individual teeth sections (upper arrow), forms both sides of blade root (lower arrow) at once. Holder is tipped back for blade removal.

And the company reports that there was no standard drilling machine available sufficiently flexible to handle the variety of holes required. Cost of making drill jigs for numerous large rings would have been a major expense.

New Britain Machine Co. went to work on P&WA's suggestions and came up with a three-head, adjustable spindle

for electrical connections through pressurized bulkheads





Electrical leads are securely locked in silver-plated sockets molded into the plastic panel. Pins for connection to these sockets are rapidly indented onto the wires. Pin and socket assemblies take a convenient range of conductor sizes and can also be made of thermocouple alloys to take thermocouple leads. Molded-in identification numbers are provided on both sides of the panel. Standard Burndy panels provide 26, 40 and 100 connections per panel. Variations can be supplied to your specifications. Approved by U.S.A.F.

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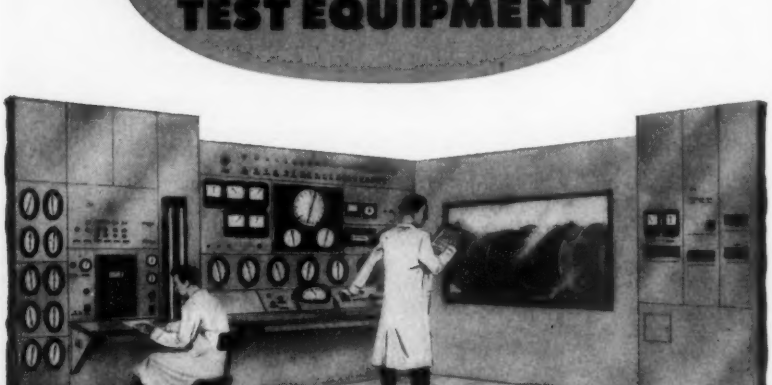

Greer's Instrumentation Control Panel, Model GEL, shown above tests completed turbo-jet engines under simulated flight. Custom-built to engine manufacturers' specifications.

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circular type drilling unit capable of handling any pattern desired, and without requiring expensive drill jigs and fixtures. It will drill, ream, and countersink with one setup of the part, with only one tool in each spindle. In some instances, it can handle two components at once.

▶**Down-Time Cut**—The machine is, in effect, universally tooled—requiring but a locating diameter and a checking ring, to insure that all holes will be drilled. The operator can easily detect when the drill isn't cutting properly and can change it in a few seconds. This minimizes down-time for tool changes, boosting production rates.

The 46-in.-diameter table is supported on ball bearings so that it can be easily finger-rotated. There is also a large handwheel. The three drilling spindle supports can be moved about the circular base through about 300 deg., sliding on two guideways. By swiveling the heads on the supporting columns and positioning the radial arms in the holding brackets, desired settings can be obtained. A control pedestal houses the stop-start and feed and retract switches for all three spindles.

Hole-pattern changeover takes about 15 or 20 min. if the multiple falls within the range of the perimeter-located index pins. These are initially spaced by equal-diameter, ground disks to give correct chordal distance for the required holes. For odd locations, index pin position is determined by V-links.

To rotate the table from one pin to the next, the operator retracts a shot-bolt by stepping on the foot treadle to trip the air valve, then moves the table and stops it at the approximate center of the next index pin, next releasing the shot-bolt, which moves in slowly to engage the locating pin without jarring the table or unduly straining the pin.

Though the machine was designed to drill and ream to within .005 in. of the true location, it checked out to .002.

Future development of the machine calls for including a horizontal drill head and a broaching spindle for certain keyholes whose angular location must be extremely exact but which must have clearance to allow for high temperatures radially. These slightly elongated holes then can be broached at the same time, without removing the part from the table.

▶**Blade Root Broaching**—P&WA's previous method for machining fir tree roots on turbine blades, was to mill the limbs on one side of the tree, then index the part and mill the limbs on the other side, using the same cutter. This method didn't give the necessary accuracy nor sufficiently low production time.

The conventional multi-tooth setup

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(long, solid broaching tool) imposed limits on the operation. Teeth could not be relieved to adjust the amount of cut and the multiple-tooth section could not be made as hard as individual teeth can be made.

Now, both sides of the blade root are formed at one pass on a Lapointe 15-ton, 90-in. vertical broach, using individual teeth (shallow cutter) instead of the long multi-tooth arrangement. This set-up departs from the old idea that several teeth should be in the cut at one time, which, P&WA tool engineers say, is obsolete, because today's machines are so constructed that the ram guides give firm control over stroke alignment, and the teeth can be used for their primary function—cutting. And greater chip clearance is provided, because teeth are more widely spaced than in the old method.

Furthermore, it has required high skill to prepare multi-tooth broach sections, whereas now the desired accuracy is obtained through controlling the form of the grinding wheels which dress the teeth, so that the operation can be performed by a workman of average ability.

Because of blade material characteristics, the roots are broached .005 in. oversize. Remaining stock is removed with a surface grinder, whose wheel is dressed with a Diaform dresser, at a 10:1 ratio, or on a two-wheel Excello or J&L grinder designed for the operation.

The combination of broaching and grinding gives the finish accuracy required and is less expensive than the old method of milling.

A distinct advantage of the individual tooth-section is that it can be used up completely, for an appreciable saving in the consumption of highspeed cutting materials.

And P&WA is now studying the application of carbide tips on the broach teeth.

► **Lathe-Grinder Combination**—The turbojet's large number of thin-wall rings and weldments call for close control of size and surface finish—best achieved on a grinding machine. But subsequent operations on these parts, such as recessing and chamfering, ordinarily will require another machine—engine lathe or boring mill.

This prompted P&WA's tooling men to devise a scheme for performing a lathe operation while the ring was still mounted in the grinder. They took the turning slide of a Monarch engine lathe and mounted it onto the bed of a Heald 174 internal grinder, so that recessing or chamfering could be done without removing the piece from the chuck. This one-setup arrangement saves time and gives greater accuracy by insuring concentricity of cuts.

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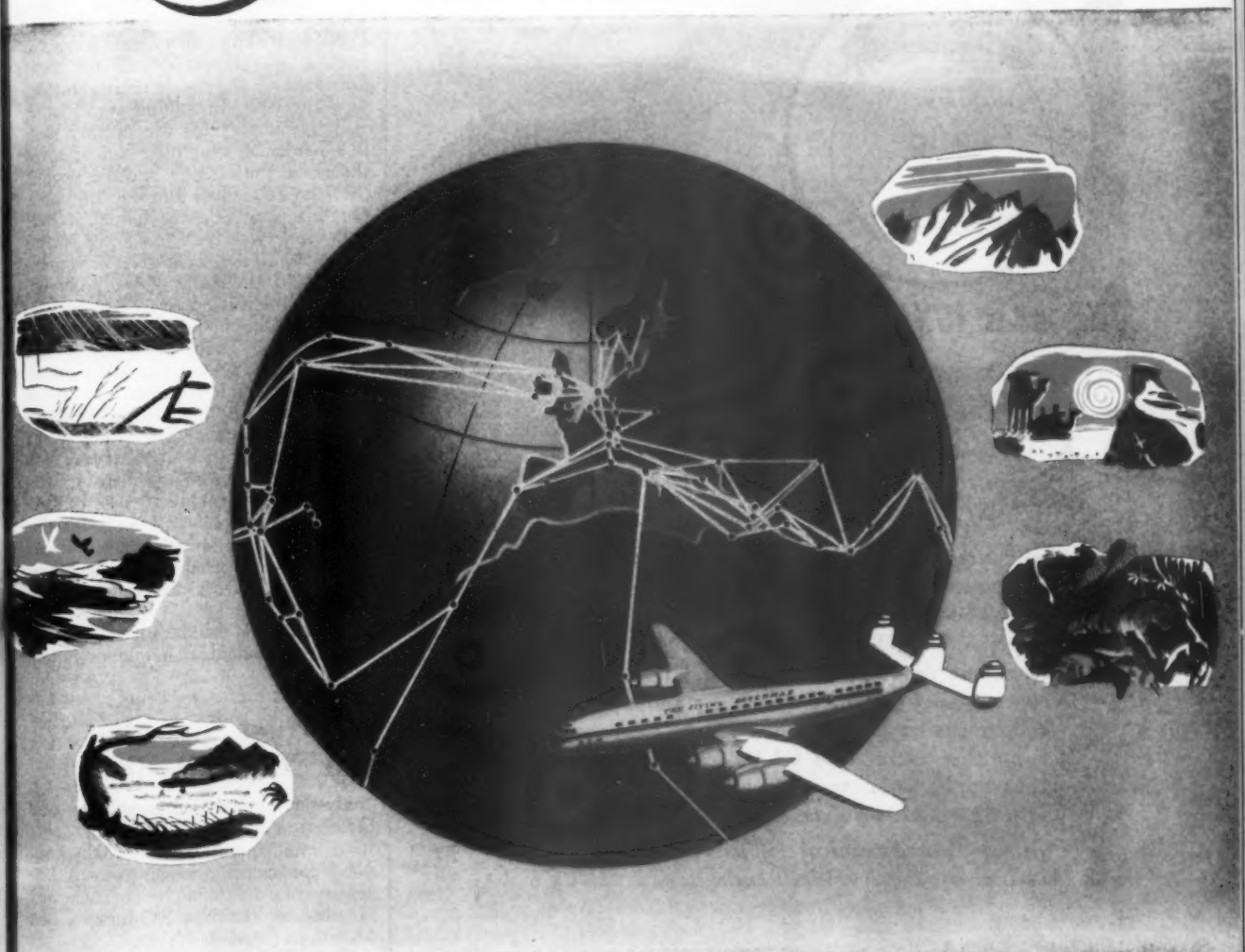

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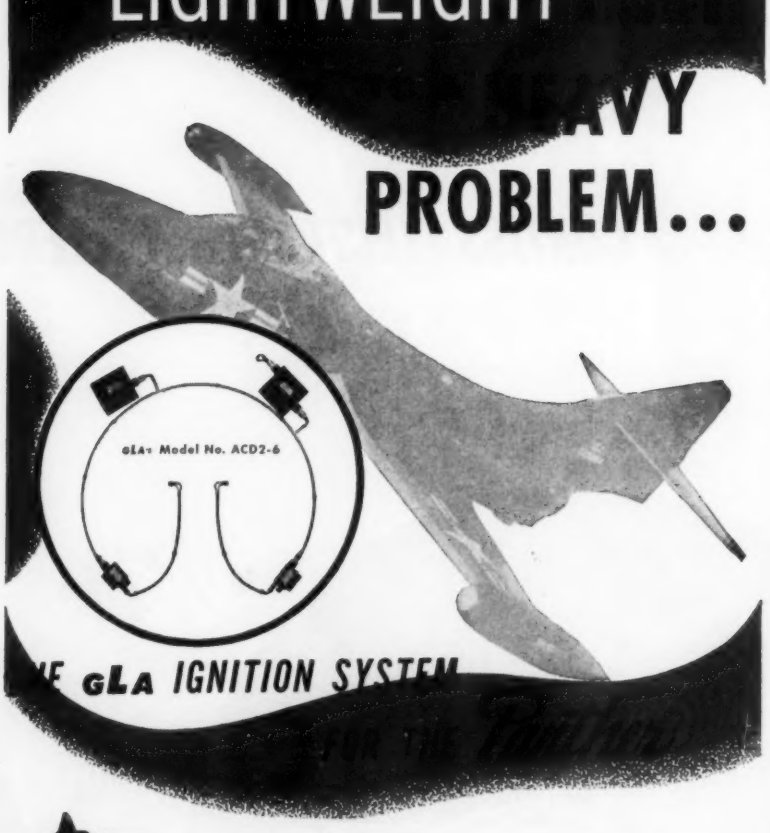

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siderable over a lathe capable of swinging a 48-in. ring.

► **Turret Lathe Flexibility**—P&WA engineers wanted flexible tooling to cope with the problem of fabricating under a semi-production status a large number of compressor and turbine disks still subject to design changes.

The turret lathe's flexibility combined with more or less "permanent" tooling offered an answer if sufficient rigidity could be incorporated for easy machining of heat-resisting alloys with carbide tools.

A pre-World War I Harkness lathe with heavy, flat sliding turret carried an abundance of tool-holding screws. This basic arrangement was adapted by P&WA tooling men and Jones & Lamson put these features for them into a heavy duty unit of modern design—the 10-B cross-sliding turret lathe.

Extra support for the cutting tools is a hardened steel plate which spans the gap in the carriage, abutting against the base of a small four-way tool post. On this plate ride the hardened steel bolts projecting from the lower part of the tool-holders. This gives maximum rigidity to the cutting tools, because in effect there is no turret overhang.

A large number of tool-holding screws are provided. These are so placed that a wide range of tools can be mounted. The single-point tools are positioned in the holders by templates corresponding to the contour of the disk to be cut. By using an assortment of templates, P&WA tooling men estimate that they can machine 16 sizes of disks on both sides. Not all tools for this range can be set up at once, but at one time all tools needed for machining both sides of two sizes of disks can be handled.

Several tools can be used to remove metal simultaneously in plunge-cutting the forgings.

Contract Awarded For Navy Missiles

Hycon Manufacturing Co. and Oedekerk & Ludwig, Pasadena, Calif., have won a joint multi-million-dollar Navy contract for an air-to-air rocket-type missile developed by engineers and scientists at the Naval Ordnance Test Station in Pasadena.

Both firms made rocket ordnance in World War II.

Production under the new contract will be carried on at existing plants and shops of the two companies as well as in expanded facilities now being set up. Deliveries are to start in three months.

The missile is described as small enough to be carried in quantity by high-speed jets, yet powerful enough to destroy any known aircraft with one direct hit.

Ingenuity Marks French Patents

SNCASO will license 11 aircraft design features it has developed.

The design ingenuity of French aeronautical engineers of SNCASO is emphasized by descriptions and sketches of some of their patents recently made available for licensing agreements by the French firm.

Patents are in the field of aerodynamics, rotary-wing craft, comfortization, alighting gear and jet tailpipes.

▶**Boundary-Layer Control**—One ingenious development is in the field of boundary-layer control. The SNCASO invention combines suction and blowing, the latter scheme utilizing ejectors.

The general arrangement can be seen from the drawing. The wing has a double trailing edge flap and nose flap. Air is bled from a gas turbine and fed out through the wings in a small duct. The primary driving jets for the ejector are fed from this duct. They discharge into the ejector tube, which has a mixing chamber and a discharge nozzle which directs the blast of air over the upper surface of the second flap.

The only disturbing feature is that the secondary air for the ejector is taken from what is referred to as a "suction chamber, where enters the flux coming either from the slot between the wing and the first flap or from the leading edge slot". It would seem that suction pressures at the entrance to an ejector are not exactly desirable. Presumably this could be cured by venting the secondary air source to the lower surface of the wing.

▶**Ramjet Copters**—Another patent deals with feeding fuel to the rotor-tip ramjets on a helicopter. SNCASO points out that the propulsive efficiency of a ramjet on a rotor varies cyclically with each revolution. Consequently, to maintain high efficiency, the ramjet fuel feed must also be varied cyclically.

This cyclic variation of ramjet thrust also creates a resultant propelling force which helps the translatory motion of the craft.

Two devices are covered by the patents: One is purely mechanical and uses cams to actuate feed valves; the other is electro-mechanical and uses a collector and electrically operated valves.

SNCASO holds a patent to provide a directional control system for jet-driven rotors. In such aircraft, there is no engine torque to be compensated for in flight and a tail rotor is not needed. But some torque must be generated to make directional control at low speeds possible, and aerodynamic rudders are rather inefficient.

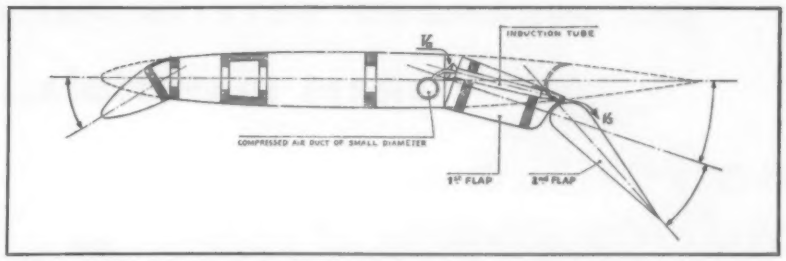
So a transmission system is inserted between the rotor and the engine (which drives the compressor in jet rotorplanes or the rotors in a twin-rotor arrangement); the transmission has infinitely variable ratios and a slip device (friction brake). This transfers mechanical power from the engine to the rotor shaft, producing a torque which rotates the fuselage to the desired position.

▶**Nozzle Variations**—One of the problems plaguing jet aircraft designers is the development of a device for varying the exit area of the engine tailpipe. SNCASO tackled the problem and came up with a ring of airfoil section in an axial plane, mounted at the exit of the pipe. By changing the position of the ring, the exit area can be varied. Maximum effective section is about twice the minimum, which appears to be an adequate range of values.

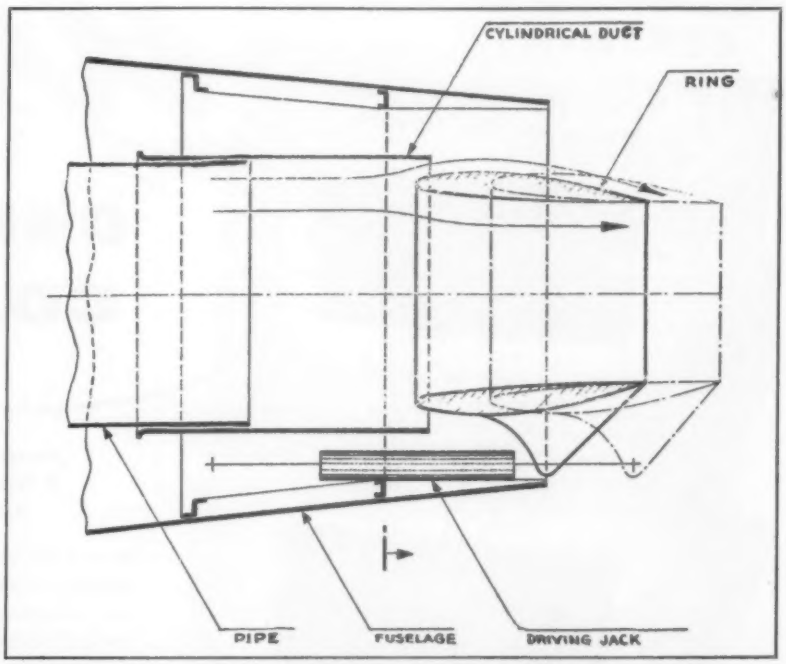
The increasing use of bogie wheels or bicycle landing gears in the fuselage of planes (our B-47, for example, or the French SO M.2) has prompted the design of wingtip landing gear. One of these, developed by SNCASO, is automatically detachable. The main strut of the gear is carried on the leading edge by two hemispherical concave lugs attached to the wing by ball joints.

When takeoff begins, the wheels are kept on the ground by spring jacks housed in the strut. As the jacks expand (when weight of plane is gradually lifted during takeoff run) a mechanical linkage is actuated to turn and release the ball joint. The stabilizing gear then detaches itself and falls away.

▶**Retractable**—A similar gear has been devised which can be retracted into the wingtip. In this gear, the wheel is



BOUNDARY-LAYER control scheme utilizes suction and blowing to increase wing lift.



NOZZLE AREA of jet tailpipe is varied by movable annulus of airfoil cross-section.

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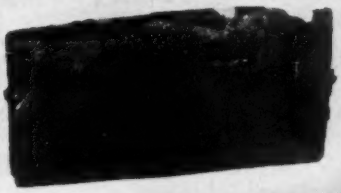

Shown above: a high temperature alloy after suspension in a combustion gas stream for 232 hours. Temperature was in excess of 2200°F. and there was actual flame impingement on the metal itself. The effects of intergranular corrosion and oxidation under such conditions are obvious.

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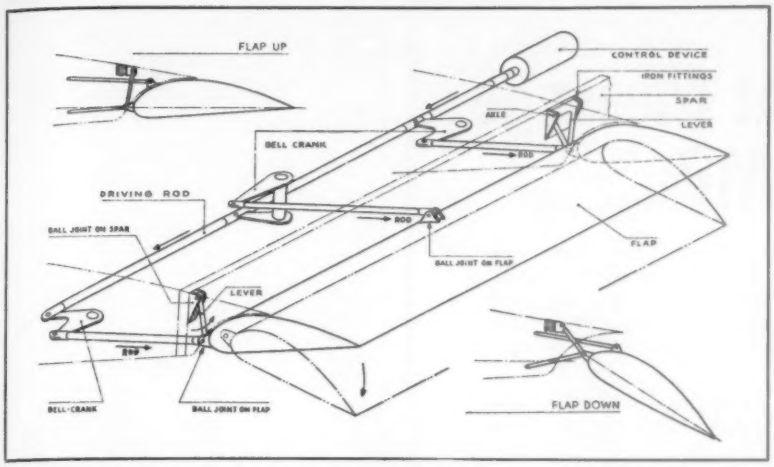
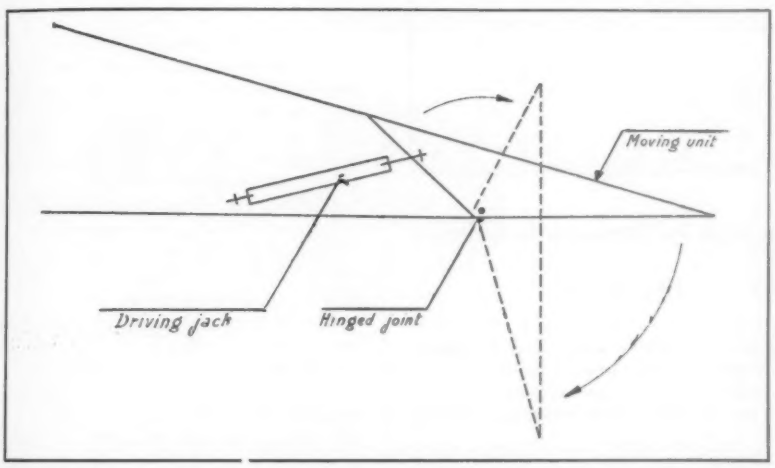


FLAP LINKAGE for thin wings uses master driving rod, bell cranks and slave rods.



AIR BRAKE increases drag, does not change lift; pitching moment can be controlled.

mounted on two jacks. One provides the folding motion. The second is a vertical retraction jack, which acts independently of the first.

In use, the retraction jack lowers the wheel fully for low speed ground handling. The wheel is raised fully (but not retracted) for landing; in this case, the main wheels take the impact load, and the wingtip wheels act much like safety skids, coming into use only when the aircraft rolls slightly in one direction.

Investigation by SNCASO into the methods of wing flap attachment have produced a linkage in which the flap is driven from rods attached to bell-cranks. The cranks are operated by a single spanwise rod to which is fastened the actuating cylinder.

The claim is made that with this linkage the entire assembly—hinges, fittings, actuators—can be located within the contour of even a thin wing. SNCASO further claims that the flap movement can be equivalent to a revolution about a theoretical axis located at any designed distance beneath the wing. And, it is pointed out, the assembly does not require exact adjustment; interchangeability is assured because tolerances of several millimeters are permissible.

▶ **Brakes**—A simple air brake has been developed which increases the aircraft drag without affecting the lift. Furthermore, the brake can produce either no change of pitching moment, or a change in a selected direction, as desired.

Several SNCASO craft use the brake, which can be fitted either on the wing trailing edge, or on the wing flap if necessary.

For interior finishing of their transport, the SO.30, the Sud-Ouest engineers developed a method of fabric or thin sheet fastening. A channel section holds a coil spring between the outstanding legs of the section. The open-side width of the channel is less than the spring diameter. To use the fastener, sheet materials are wrapped round the spring and then the spring is

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An Important Message on CMP

It has come to our attention that some steel consumers, particularly those concerned with "B" products, have been requesting allotments from their steel suppliers or passing on to them their allotment authorizations. This is contrary to CMP regulations, and seriously delays the entire allotment procedure for you.

Therefore, in an effort to help clarify this situation, we have briefly indicated below the general procedure which should be followed in securing an allotment.

▶ We would like to emphasize that steel warehouse distributors are not involved with the handling or issuance of allotments. When placing an order with your steel supplier, simply show your allotment number and the quarter for which the allotment is valid (Example: K-2-4Q51). Orders must also be properly certified under CMP regulations.

The General Requirements For Obtaining An Allotment

CLASS "A" PRODUCERS

1. If you are a producer of a class "A" product, you will get your allotments for controlled materials from the claimant agency (governmental), prime consumer (seller to claimant agency), or secondary consumer (seller to prime consumer) to whom you sell your product. IN EACH CASE, GO DIRECTLY TO YOUR OWN CUSTOMER FOR AN ALLOTMENT.

2. Your allotment application (Form CMP-4A) must include the amounts of controlled materials needed by your sub-contractors as well as by you.

3. You need not apply for controlled materials used for class "B" products to be incorporated in your class "A" product, since producers of class "B" products will receive their allotments direct from the NPA.

CLASS "B" PRODUCERS

1. If you are a producer of a class "B" product your application for controlled materials on Form CMP-4B must be sent to the proper industry division of NPA. You cannot obtain an allotment from any other source.

2. Your application Form CMP-4B must show all the controlled materials you need, as well as controlled materials needed by your sub-contractors producing class "A" products to be incorporated in your class "B" product.

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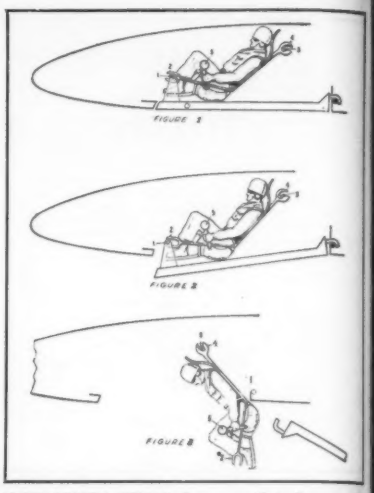

EJECTION SEAT dumps pilot down and out.

forced into the channel section.

The claims are that the system makes possible dismantling without damage, that the fabric can be retensioned for better fit, and that the fabric cutting for installation need not be as precise as before this system was used.

▶ **Ejection Seat**—The problem of flight evacuation from a high-speed plane has prompted an interesting solution. The patent covers a scheme for the downward ejection of the pilot.

The linkage is so arranged that when the pilot pulls the actuating handle, the seat and door below it fall away together. As the drop continues, the door separates from the seat. Finally, the seat drops clear and the pilot is ejected head first.

The absence of vertical acceleration during the ejection is one of the chief advantages claimed by SNCASO engineers for this method.

Another design feature used on the SO.30 transport is the pressure-tight door. This door can be applied to any fuselage of circular cross-section.

The door slides on circular guides and retracts beneath the cabin floor. When closed, the door is forced against the inside of the fuselage frame by cabin pressure, which makes possible a lighter door than one which closes in the more normal manner against the outside of the fuselage frames.

SNCASO says that the door has never caused trouble. Only indication of load on the door is the figure of three tons at 20,000 ft.

SNCASO (Societe Nationale de Constructions Aeronautiques du Sud-Ouest) is one of the nationalized French aircraft factories. Further technical data on the inventions and details of financial agreements may be obtained from M. le Chef du Service des Ventes de la SNCASO, 105 Avenue Raymond Poincare, Paris, 16eme, France.

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AISI 321 stainless steel samples tested at 1,850F.: Piece (left), with the Solaramic ceramic coating after 150 hr. Uncoated sample (right) after 20 hr.

Ceramic Liners

Common metals with new Solar coating can replace scarce alloys.

Solar Aircraft Co.'s efforts in high-temperature ceramics research have paid dividends.

The company has developed a new coating process that will boost life expectancy of jet engine parts, and give an equivalent staying power to more common metals substituted for scarce-category alloys.

While this "Solaramic" process now is being applied chiefly to jet engine components, other military possibilities include rockets, guided missiles and all types of heat engines. Application in civilian industries also appear extensive.

► **Vanishing Nickel**—The combustion

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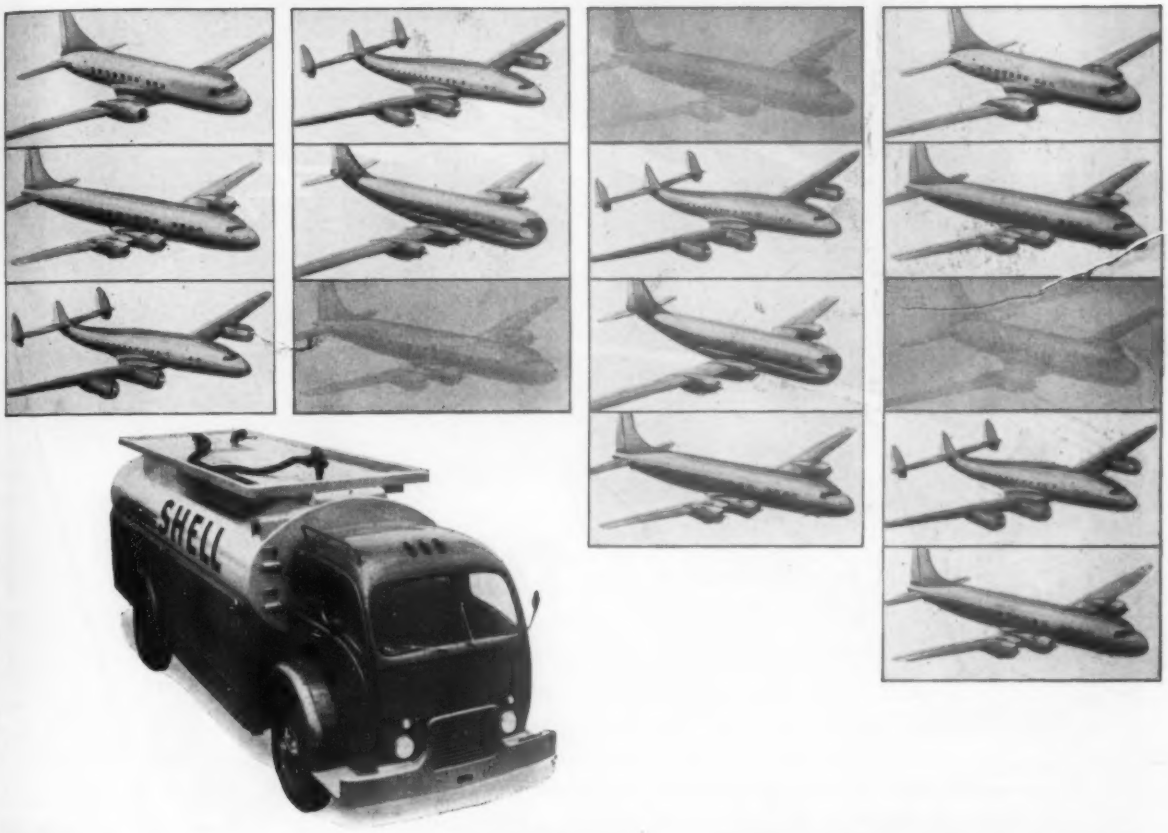

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chamber is one present example of the process' application. The can's liner has been produced from an alloy containing approximately 78% nickel, with a life of about 200 hr. With Solar's coating, a less-expensive stainless steel with 8% nickel content will stand up for the same time, the company reports.

Here is a summary of some of the advantages Solar advances for its coating:

- **Protection against oxidation** and corrosion at high heat.
- **Savings in critical materials** and feasible use of "leaner" alloys in many high-temperature applications.
- **Reduction of hot spots** because of the ceramic's heat-conductivity characteristics.
- **Reduction of cracking** and warping.
- **Specific surface treatment**—smooth, rough, heat-reflecting, or heat-absorbing.
- **Improved metal fatigue** properties.
- **Higher temperature use** with coated parts than with same material uncoated.
- **Covers all types of welds.**
- **Good adherence** in distortion and to various gages of materials.
- **Stabilization** of metal surfaces.
- **Thinness** combined with strength.

Solar says that its coating is much thinner than other ceramic coatings, that it can be heated or cooled rapidly without cracking or flaking, and in some applications expands and contracts with the metal.

Government agencies also have been engaged in extensive research in the field of ceramics. Solar reports, however, that it is the only company in this country working on a non-government-sponsored, high-temperature, ceramic research program, receiving no financial aid from government or other sources.

NACA Reports

▶Analysis of Temperature Distribution in Liquid-Cooled Turbine Blades (TN 2321)—by John N. B. Livingood and W. Byron Brown.

This report presents a variety of analytical methods for computing temperature distributions in liquid-cooled turbine blades. The methods are first presented mathematically and then numerical examples are used to compare simplified and more-complete solutions as well as to find the effects of several variables. Some of the temperature distribution calculations can be simplified by the use of non-dimensional charts which are also given.

One significant result is that for blade materials having low thermal conductivity (which would correspond to currently used blade materials) an equation using a one-dimensional, spanwise temperature distribution is applicable near a coolant passage. Irrespective of blade length, the cooled part of the blade remained at a uniform temperature which is called the prevalent blade temperature. This prevalent blade temperature increased about 150F for an increase of 1000F in a difference between effective gas temperature and coolant temperature. This held true for a range of effective gas temperatures from 2000F to 5000F.

In cases where rim cooling is insignificant, a one-dimensional chordwise temperature-distribution equation sufficed for first-order approximation.

Complete one-dimensional spanwise temperature distribution method is developed mathematically in an appendix, along with a three-dimensional and a one-dimensional chordwise temperature distribution. Several numerical examples are included to show the method.

▶Experimental Investigation of Localized Regions of Laminar-Boundary-Layer Separations (TN 2338)—by William J. Bursnall and L. J. Loftin, Jr.

One of the unusual phenomena in boundary-layer flow is referred to as the laminar separation bubble. This is

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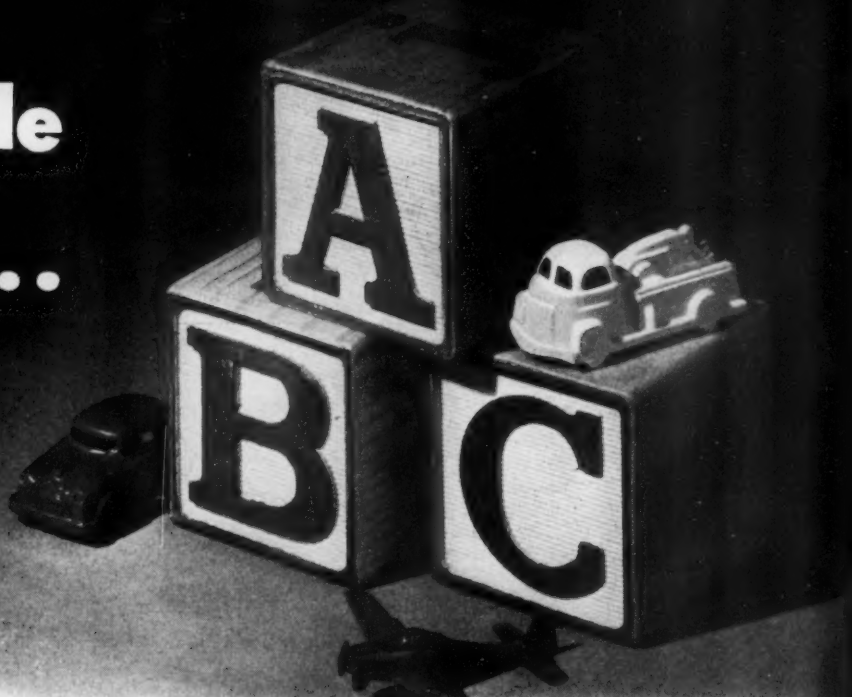

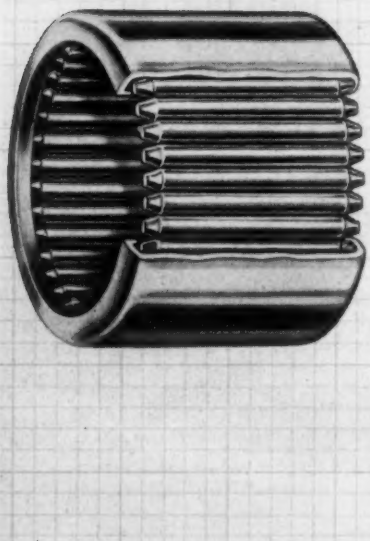

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observed under certain circumstances as a localized region of separated flow behind the laminar separation. Downstream of the bubble, the boundary layer reattaches itself to the surface.

Observation has indicated that the existence and size of these localized regions of separation depend in some way upon the Reynolds number. But no information is available which indicates that such a region will exist under a given set of conditions or what the extent of the region will be if it does exist.

In an effort to gain detailed information on the formation and behavior of localized regions of laminar separation, the investigation reported in this note was made on an NACA 66 series airfoil section. Particular test conditions and this airfoil were chosen because large localized regions of laminar separation were believed to exist.

One reason for the investigation was that it was believed that a knowledge of the parameters controlling the laminar bubbles at or near zero lift would prove of value in future investigations near maximum lift.

The length of laminar boundary layer between separation and transition was found to depend on the Reynolds number of the boundary layer at separation. After transition occurred in the separated layer, turbulence spread at a relatively constant angle. The nature of the flow in the turbulent boundary layer was not satisfactorily predictable by the usual method for estimating the rate of growth and the change in shape.

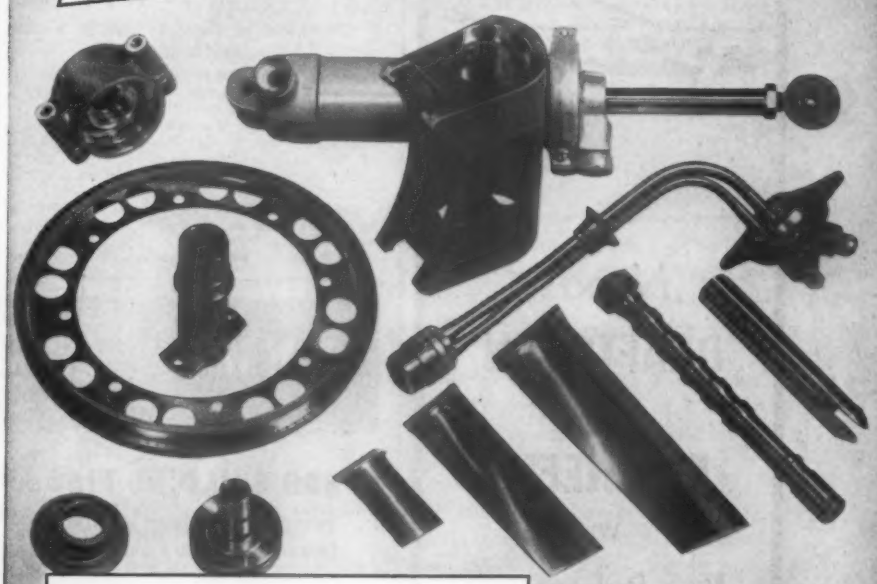
▸**A Plan-Form Parameter for Correlating Certain Aerodynamic Characteristics of Swept Wings (TN 2335)—by Franklin W. Diederich.**

It has long been aerodynamic practice to use geometric aspect ratio as a means for correlating and analyzing certain parameters of unswept wings. For the case of swept wings, however, the significance of the aspect ratio is not obvious. In fact, neither geometric aspect ratio nor any other known parameter (which can be tied in with the geometry of the wing) can serve as readily to correlate the aerodynamics of swept wings.

In this note the author expresses approximately the lift curve slope and the coefficient of damping in roll for swept wings in compressible subsonic flow. He then relates the finite span effect on these aerodynamic characteristics as functions primarily of a plan-form parameter. This parameter is a function of the aspect ratio, the lift curve slope of the section and the angle of sweep.

The author discusses the use of this parameter in presenting and correlating aerodynamic characteristics and also the limitations attendant upon such use. —DAA

For JETS and PROPS...



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ABOVE: Typical precision aircraft parts manufactured by Ex-Cell-O. All details of assembled units were manufactured at Ex-Cell-O to customers' specifications.

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Since the introduction of jet-powered planes Ex-Cell-O has developed special machine tools for the volume production of compressor parts and fuel system parts and sub-assemblies, including nozzles.

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AF Contracts

The Air Force has announced contracts valued at over $16 million for the week ended July 13. The week's list includes 61 contracts of "over $250,000." Actual values of these contracts is not given. The complete list:

Adel div., General Metals Corp., Burbank, Adel feathering pumps, Cl. 03A, 5,320 ea., $770,000.

Aero Industries Technical Institute, Oakland, Calif., necessary facilities and training for AF military personnel in sheet metal, airframe repair for 15 weeks, over $250,000.

AiResearch Mfg. Co., div. of Garrett Corp., Los Angeles, ground portable heaters, over $250,000.

Air Products Inc., Allentown, Pa., oxygen generator plants, Cl. 19B, over $250,000.

Airquipment Co., Burbank, stand assemblies, Cl. 19A, 51 ea., $31,785.

Allied Aircraft Co., No. Hollywood, modification of GFP antenna assemblies, Cl. 16K, 26 ea., $32,916.

American Air Filter Co., Inc., Moline, Ill., gasoline engine driven blowers, Cl. 19A, over $250,000.

American Airmotive Corp., Miami Springs, Fla., services and materials to overhaul engines, over $250,000.

Appliance Mfg. Co., Alliance, O., adapter assemblies, Cl. 11B, over $250,000.

Arizona State College, Tempe, Ariz., training 375 AF military personnel as stenographers for 26 weeks, $263,798.

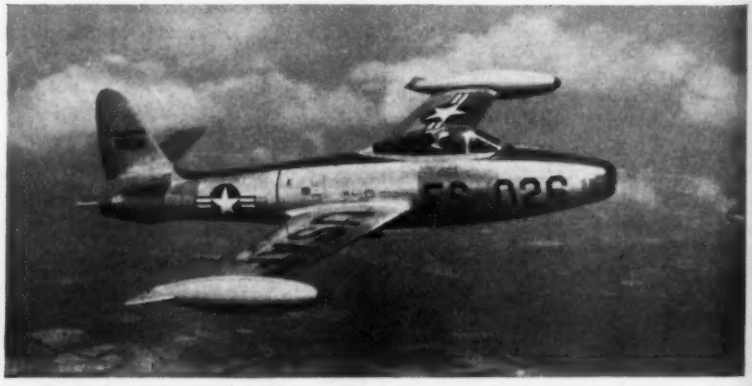
Arlington Aeronautical School of Flight & Engineering, Inc., Tillanook, Ore., facilities and training for AF military personnel in airplane maintenance fundamentals for 15 weeks, over $250,000.

Auto-Lite Battery Corp., Toledo, aircraft

NEWS Edo NOTES

EDO BUILDING FINS AND RUDDERS FOR F-84-G

Swinging into high gear at our College Point plant, across the bay from LaGuardia Field, is a program to manufacture fins and rudders in volume for the Republic F-84-G now being built in increasing numbers to build up America's fighter strength.



These parts for the F-84 are not the only aircraft components being built at Edo's plant where, over a period of 26 years, many new aluminum fabricating techniques were pioneered in making the famous Edo seaplane floats more efficient. Details for napalm tanks for the F-84, wing tip floats and pedestals for the Grumman SA-16 Albatross, air borne radar nacelles and other sub-assemblies are also taking shape under the skillful hands of experienced men using the finest, most modern machines and equipment.

EDO ODDITIES. A-3 lifeboats made by Edo are stationed with Air Rescue Squadrons of the Military Air Transport Service along the over-ocean routes of the world's airways. But oddly enough, one of the first operational drops by the Air Rescue Service was made, not over the ocean, thousands of miles from shore, but at Cottonwood Falls, Kansas to rescue survivors of recent devastating floods.

Edo CORPORATION
COLLEGE POINT, NEW YORK

It's time we got *working* mad!

As we listen to the latest insults from Moscow, we're likely to get fighting mad.

Instead, we'd better use our heads and get *working* mad.

It is clear by now that Stalin and his gang respect just one thing—strength. Behind the Iron Curtain they've been building a huge fighting machine while we were reducing ours. Now we must rebuild our defenses—*fast.*

As things stand today, there is just *one* way to prevent World War III. That is to re-arm—to become strong—and to stay that way!

This calls for better productivity all along the line. Not just in making guns, tanks and planes, but in turning out civilian goods, too.

Arms must come first. But we must produce arms *at the same time* we produce civilian goods.

We can do this double job if we all work together to turn out more for every hour we work—if we use our ingenuity to step up productivity.

All of us must now make sacrifices for the common good. But we're working for the biggest reward of all —*peace with freedom!*

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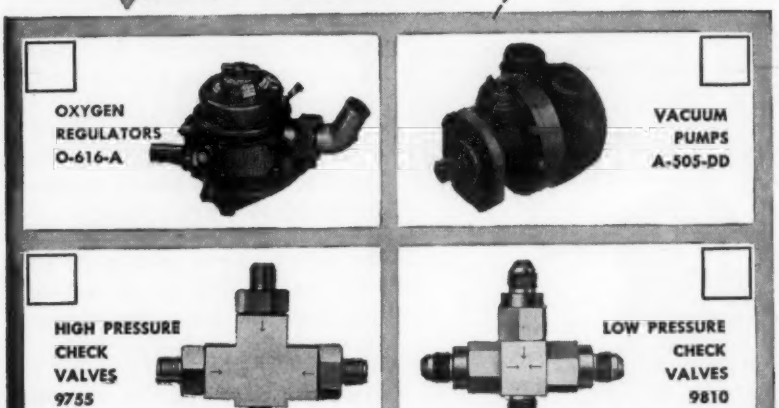

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GREASE FITTINGS

storage batteries, Cl. 03J, 3,602 ea., $210,086.

Barber-Colman Co., Rockford, Ill., micro-positioner, switch, actuator assy., block, cam, arm cont., Cl. 03C, 40 ea., 20 ea., 74 ea., 30 ea., 20 ea., 100 ea., $56,200.

Beech Aircraft Corp., Wichita, generator sets, Cl. 19A, over $250,000; aluminum fuel tanks, Cl. 03L, over $250,000.

Bendix Radio div., Baltimore, radar set, Cl. 16C, over $250,000; transformers, Cl. 16E, 1,300 ea., $25,351.

Blackstone Mfg. Co., Chicago, indicator, Cl. 05, 250 ea., $75,000.

Board of Regents, U. of Calif., Berkeley, Calif., to subcontract with Linfield College for development of a field emission type cathode, $50,000.

Boeing Airplane Co., Seattle, dolly assemblies, Cl. 19A, over $250,000; modification of planes into reconnaissance planes, Cl. 01F, over $250,000; engine ground test program, $210,000.

Bowling Green State U., Bowling Green, O., facilities & training for 450 AF military personnel as clerk-typists for 12 weeks, $170,019.

California Eastern Airways, Inc., Oakland, Cal., provide installation lots for equipment, 1,085 ea., $217,770.

California Flyers School of Aeronautics, Inglewood, Calif., necessary facilities and training for 360 AF military personnel in airplane maintenance fundamentals for 15 weeks, $127,333.

Camfield Mfg. Corp., Grand Haven, Mich., deep cast aluminum aircraft antenna, Cl. 16A, over $250,000.

Cappel, MacDonald Co., Dayton, sustenance kit, emergency, Cl. 20B, over $250,000.

Cardox Corp., Chicago, storage units, Cl. 19A, over $250,000.

Central State College, Edmond, Okla., facilities for training 425 AF military personnel as clerk-typists for 12 weeks, $169,416; facilities and training for 250 AF military personnel as clerk-typists for 12 weeks, $70,826.

Century College of Medical Technology, Chicago, facilities and training 200 AF military personnel as radiology technicians for 16 weeks, $134,303.

Cessna Aircraft Co., Wichita, for aircraft, Cl. 01A, over $250,000.

Chicago Pneumatic Tool Co., Detroit, wrench, impact pneumatic, Cl. 17A, 1,400 ea., $210,000.

Cincinnati Cleaning & Finishing Machine Co., Ironton, O., washer, Cl. 17A, 5 ea., $28,190.

Colorado State College of Education, Greeley, Colo., training 350 AF military personnel as clerk-typists for 12 weeks, $157,500.

Consolidated Vultee Aircraft Corp., Ft. Worth, services and materials for engine nacelles in aircraft, over $250,000.

Continental Electric Co., Inc., Newark, N. J., generator sets, Cl. 17A, over $250,000.

Cornelius Co., Minneapolis, compressors, Cl. 17A, 343 ea., $182,447.

Curtiss-Wright Corp., Electronics div., instrument flying trainers, Cl. 28A, over $250,000.

Curtiss-Wright Propeller, Caldwell, N. J., additional training parts, tools, and equipment, Cl. 03A, over $250,000.

DoAll Cincinnati Co., Cincinnati, contour sawing and filing machines, Cl. 17A, over $250,000.

Douglas Aircraft Co., Santa Monica, services and materials necessary to perform structural repair of AF aircraft, Cl. 01D, $101,025; implement procurement of aircraft at Tulsa, Okla., over $250,000.

Douglas Aircraft Co., Tulsa, facilities for production of airplanes, over $250,000.

Durham Aircraft Service, Inc., Woodside, N. Y., services to overhaul engines, 299 ea., $71,562.

Eastman Kodak Co., Rochester, photographic aerial film, Cl. 10C, over $250,000.

East Texas State Teachers College, Commerce, Tex., facilities & training for 450 AF military personnel as clerk-typists for 12 weeks, $224,610.

Eaton Mfg. Co., Battle Creek, Mich.,

(*Continued on p. 47*)

This slim goliath developed for the U. S. Navy has successfully completed ground qualification tests and is ready for flight.

Outstanding
NEW JET ENGINE

One of the most powerful turbojet engines in the world, the new Westinghouse J40 develops thrust equivalent to 14,000 hp at modern flight speeds. This power output will be approximately doubled by the addition of an afterburner.

INTEGRAL AUTOMATIC ELECTRONIC CONTROL

This is the first turbojet engine with a completely integrated, automatic electronic control system to pass the stringent type test of the combined U. S. Military Forces. Complete operation from standstill to top altitude and speed is accomplished with a single cockpit control—leaving the pilot free to attend to navigation, battle tactics—battle itself. This is only one of the many distinctions of the J40 which place it in the forefront of today's jet propulsion field.

Look for further developments about the J40... it will spark a whole new group of speedier, high-performance military aircraft. Look to Westinghouse research and engineering for constant progress in jet aircraft power. J-54007

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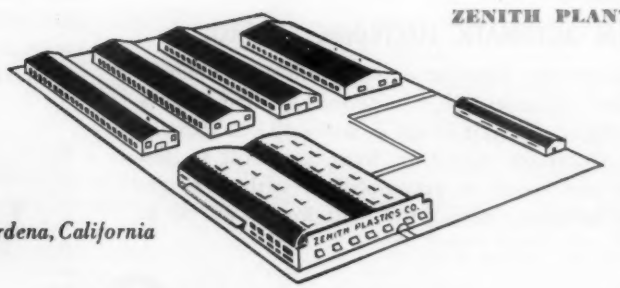

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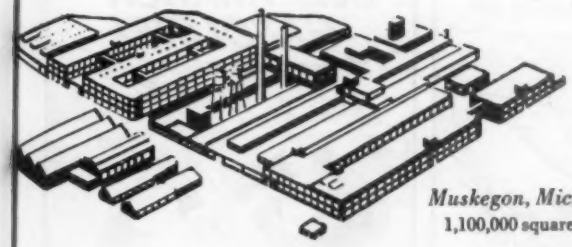
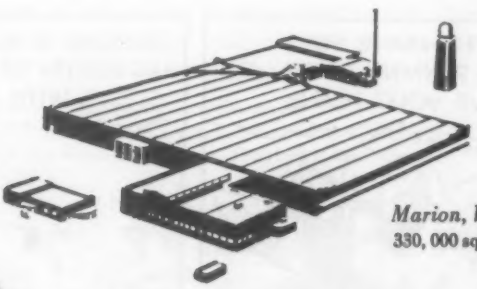


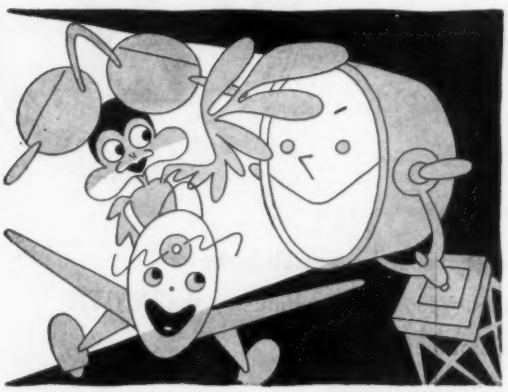
Muskegon, Michigan
1,100,000 square feet



Marion, Virginia
330, 000 square feet

The Birdmen's Perch

Maybe you chaps weren't aware of it, but you came within an ace of losing those helpful airway beacons.



It's a fact, a discontinuance and disposal program was already under way by the CAA when the squawks began.

Even though the beacons aren't essential to the airlines, the CAA has now learned of their great importance to pilots of personal and small industrial planes who fly *without* all the latest navigational equipment.

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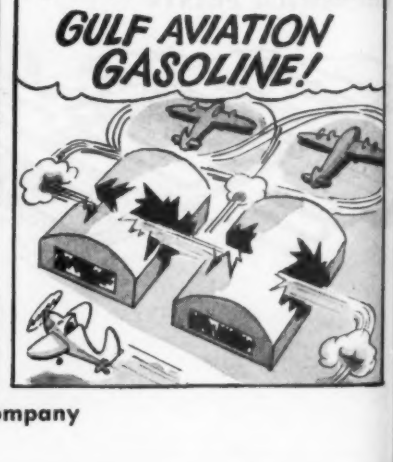

Gulf Oil Corporation . . . Gulf Refining Company

(Continued from page 42)

facilities for the production of engines, over $250,000.

Eclipse-Pioneer div., Teterboro, N. J., indicators, Cl. 05G, over $250,000; indicator, directional heading gyro, Cl. 05C, over $250,000.

Edo Corp., College Point, L. I., N. Y., floats, Cl. 03G, 25 sets, $92,772.

Elcor, Inc., Chicago, inverters, Cl. 03C, 4,005 ea., $71,500.

Electric Storage Battery Co., Cleveland, aircraft storage batteries, Cl. 03J, over $250,000.

Erie Foundry Co., Erie, Pa., steam drop hammers, over $250,000.

Fairchild Camera & Instrument Co., Jamaica, N. Y., cameras, spare parts, Cl. 10, over $250,000.

Fairchild Engine & Airplane Corp., Fairchild Engine div., Farmingdale, L. I., N. Y., powerplants and spare parts, Cl. 02B, over $250,000; auxiliary powerplants, Cl. 02B, 65 ea., $82,725.

Fletcher Aviation Corp., Pasadena, Calif., aluminum fuel tanks, Cl. 03L, over $250,000; aluminum fuel tanks, Cl. 03L, over $250,000.

Game-Time, Inc., Litchfield, Mich., stand assemblies, Cl. 19A, over $250,000.

General Electric Co., Dayton, rectifiers, Cl. 17A, 235 ea., $169,450.

General Electric Co., Schenectady, voltage regulators, Cl. 03C, 5,712 ea., $232,600; transformer rectifiers, Cl. 03C, 294 ea., $56,062; turbojet engines, Cl. 02A, over $250,000; turbosuperchargers, Cl. 03E, 211 ea., $218,000.

General Electric Co., Syracuse, switching units, Cl. 16E, 80 ea., $60,610.

Georgia Institute of Technology, Atlanta, training 150 AF personnel in armament electronics fundamentals for 19 weeks, $76,751.

Gornam-Rupp Co., Mansfield, O., fuel pumping unit, Cl. 15, 203 ea., $185,948.

Gould-National Battery, Inc., Depew, N. Y., storage batteries, Cl. 03J, 1,575 ea., $78,926.

Guardian Electric Mfg. Co., Chicago, switch, control stick, Cl. 11B, 7,872 ea., $241,444; control; projector release, Cl. 11B, 1,754 ea., $38,121.

Hartman Electrical Mfg. Co., Mansfield, O., cut-outs, relays, Cl. 03C, over $250,000.

Heppner Mfg. Co., Round Lake, Ill., heater, Cl. 11B, 11,012 ea., $25,445.

Holley Carburetor Co., Detroit, technical data, 4 ea., $34,908.

Independent Pneumatic Tool Co., Aurora, Ill., electric wrenches, Cl. 17A, 500 ea., $39,000.

Irving Air Chute Co., Buffalo, parachutes, Cl. 20B, over $250,000.

J & J Aircraft, Inc., Sarasota, Fla., training 300 AF personnel in airplane maintenance fundamentals, 15 weeks, $137,522.

Keystone Watch Case div., Riverside Metal Co., Riverside, N. J., indicators, position landing gear, Cl. 05G, 4,017 ea., $74,452.

Lawton School, Los Angeles, furnishing of facilities and training of 100 AF military personnel as radiology technicians for 16 weeks, $80,799.

Leland Electric Co., Dayton, inverters, Cl. 03C, over $250,000.

LeTourneau Technical Institute, Longview, Tex., facilities and training for 220 AF military personnel in special structural steel (high rigger) course for 10 weeks, 3 days, $112,525.

Lockheed Aircraft Corp., Burbank, modernization of aircraft, over $250,000.

Marion Screw Products Co., Marion, Ind., testers, Cl. 17C, 226 ea., $101,135.

Massachusetts Institute of Technology, Cambridge, Mass., digital information techniques and mechanisms to operate milling machines, $200,000.

McInerney Spring & Wire Co., Grand Rapids, tarpaulins, Cl. 20, over $250,000.

Morgan Machine Co., Inc., Rochester, nailing machines, Cl. 17A, 29 ea., $192,531.

National Farm Machinery Co-op Inc., Bellevue, O., jack assemblies, Cl. 19A, 635 ea, $128,341; oxygen servicing trailers, Cl. 19A, 122 ea., $144,878.

New Mexico Highlands University, Las Vegas, N. M., training 150 AF personnel as clerk-typists for 12 weeks, $33,053; train-

NEW TINNERMAN HARNESS CLAMP with Safe Interlocking Tongue and Slot

A-30114
Inset shows how curved tongue locks in place. Can't unlatch unless pressure is applied in diagonal direction and tongue is aligned with slot opening.

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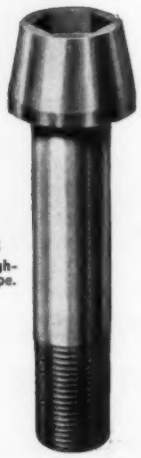

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. . . latest NAS specs . . . threads fully formed by rolling after heat treatment . . . full range of sizes. Dept 678.

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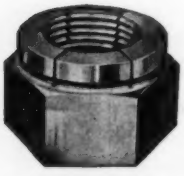
The finest equipment, workmanship and "know-how" are lavished on these vital aircraft parts. This has resulted in widespread acceptance and approval by government and civilian agencies alike.

For further information on parts shown in this advertisement please address departments listed. Inquiries on other aircraft parts should be addressed to Department 678.



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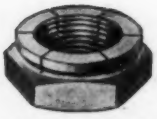

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NAS INTERNAL WRENCHING LOCK-NUTS
. . . superior safety nuts . . . sizes from ¼" to 1½ . . . Dept. 678.

Write for further information on these UNBRAKO *and* FLEXLOC *Products.*

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JENKINTOWN 3, PENNSYLVANIA

ing and facilities for 475 AF personnel as clerk-typists, $157,896.

New Mexico Western College, Silver City, N. M., training 450 AF personnel as clerk-typists, $192,780.

North American Aviation Inc., Los Angeles, tanks, Cl. 03L, over $250,000; kits, Cl. 01M, over $250,000; modification of aircraft, over $250,000.

North Dakota State School of Science, Wahpeton, N. D., training 350 AF military personnel as clerk-typists for 12 weeks, $153,720.

Northeast Missouri State Teachers College, Kirksville, Mo., training 325 AF military personnel as clerk-typists for 12 weeks, $145,782.

Northrop Aircraft Inc., Hawthorne, Calif., technical data, Cl. 30B, $35,517.

Northwestern State College, Natchitoches, La., training 250 AF personnel as clerk-typists for 12 weeks, $72,821.

Ohio School of Trades, Columbus, training AF military personnel in basic automotive preventive maintenance for 9 weeks, $181,440.

Ohio State University Research Foundation, Columbus, occupational analysis of command and staff positions, $50,000.

Oklahoma A&M College (Okmulgee Branch), training 738 AF military personnel in basic automotive preventive maintenance for 9 weeks, $168,891.

Oklahoma A&M College, Stillwater, Okla., training AF military personnel as clerk-typists for 12 weeks, over $250,000; training 150 AF personnel in armament electronic fundamentals for 19 weeks, $80,983; training 150 AF personnel in airplane maintenance fundamentals for 15 weeks, $68,388.

Pan American World Airways, Inc., services to overhaul aircraft engines, over $250,000.

Vic Pastushin Industries, Inc., Los Angeles, aluminum fuel tanks, Cl. 03I, over $250,000.

Quaker Rubber Corp., Philadelphia, hose-fire cotton, Cl. 19C, 1,500 ea., $138,750.

Radioplane Co., Van Nuys, Calif., aircraft targets, Cl. 28B, 80 ea., $103,446; services for target flight test program, Cl. 28B, $174,611.

Rapid Electric Co., New York, rectifiers, Cl. 17A, over $250,000.

Rauland Borg Corp., Chicago, amplifiers, Cl. 05E, 1,498 ea., $52,013; amplifier single channel, Cl. 05D, 3,915 ea., $127,428.

Raytheon Mfg. Co., Waltham, Mass., machinery and equipment, over $250,000.

Recordak Corp., New York, film readers, Cl. 10B, over $250,000; camera, microfile copying, Cl. 10B, 108 ea., $237,641.

Republic Aviation Corp., Farmingdale, L. I., N. Y., trainer, fuel system, Cl. 28A, 15 ea., $44,864.

Schwien Engr. Co., Los Angeles, indicators, Cl. 05C, over $250,000.

Shaw & Estes, Dallas, stand assemblies, Cl. 17C, over $250,000.

Sperry Gyroscope Co., Sperry Corp., Great Neck, L. I., N. Y., indicator, directional gyro, Cl. 05C, over $250,000.

Standard Electrical Products Co., Dayton, relays, Cl. 03C, 732 ea., $31,398.

Starrett Television Corp., New York, signal generators, Cl. 16J, over $250,000.

Stewart R. Browne Mfg. Co., Inc., New York, work lights, Cl. 08A, over $250,000.

Stewart Warner Corp., Indianapolis, heat exchanger, Cl. 19A, over $250,000.

Studebaker Corp., South Bend, machinery, equipment and constructing test cells, over $250,000.

Teachers College, Columbia University, New York, measuring effect of AF educational programs, $25,000.

Texas Aviation Industries, Honob, Tex., operation of basic flying training school, over $250,000.

Texas Engineering & Mfg. Co., Inc., Dallas, reconditioning of aircraft, over $250,000.

Thermac Co., Los Angeles, bracket, gun trunnion, Cl. 11B, 7,154 ea., $28,493.

Transducer Corp., Boston, radar training set, Cl. 28D, over $250,000.

Union Switch & Signal Co., Swissvale, Pa., bomb tails, Cl. 09B, 2,000 ea., $183,470.

United States Gauge div., American Ma-

The finest service ever between America's largest cities

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The most frequent nonstop service with 25 DC-6 Flagships each weekday

Take your pick! American's new commuter service features the greatest number of nonstop departures to New York—with return flights to Chicago every hour on the hour during the day. In addition, fast DC-6 Flagships with pressurized cabins make this service as luxurious as it is convenient.

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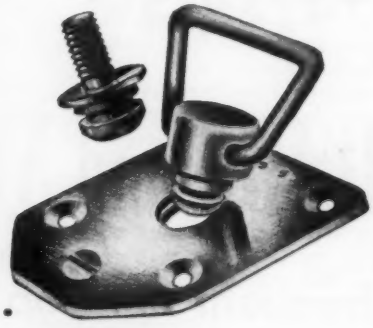

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chine & Metals Inc., Sellersville, Pa., transmitter, torque pressure, Cl. 05D, 935 ea., $51,743; indicators, hydraulic pressure, Cl. 05G, 2,431 ea., $182,059; transmitter-manifold pressure, Cl. 05D, 236 ea., $34,860.

University of Alabama, Tuscaloosa, training 275 AF military personnel as stenographers for 26 weeks, $235,798.

University of California, Berkeley, methods of assessing AF officers for command and staff leadership, $45,000.

University of Chicago, Chicago, biological & medical aspects of ionizing radiation, $75,000.

University of Cincinnati, Cincinnati, toxicological evaluation, $34,936.

University of Illinois, Urbana-Champaign, selection and hiring of experts and consultants, $44,275.

University of Toledo, Toledo, facilities and training for 100 AF military personnel as radiology technicians for 16 weeks, $79,029.

University of Washington, Seattle, toxic effects of exhaust gas, $37,268.

Vale Technical Institute, Inc., Blairsville, Pa., facilities and training for 252 AF military personnel in basic automotive preventive maintenance for 9 weeks, $81,149.

Van Norman Co., Springfield, Mass., milling machines, Cl. 17A, 21 ea., $110,460.

Vought Co., Beverly Hills, Calif., camera bodies and magazines, Cl. 10A, 2 cameras, 4 magazines, $39,775.

Washington University, St. Louis, study of external otitis, $96,576; development of an electroencephalographic screening technique, $40,770.

Welded Construction Engineering Co., Cleveland, propeller dolly, Cl. 19A, 36 ea., $42,953.

Western Electric Co., New York, mount assemblies and lines, 600 ea., $68,832.

West Texas State College, Canton, Tex., facilities and training 425 AF military personnel as clerk-typists, $180,387.

Westinghouse Electric Corp., Dayton, lamp assemblies, Cl. 08D, 110 ea., $106,553; generators, Cl. 03C, over $250,000.

Weston Electrical Instrument Co., Newark, temperature bulbs, Cl. 05D, 5,514 ea., $34,297; indicators, Cl. 16, 956 ea., $82,489.

Rudolph Wurlitzer Co., North Tonawanda, N. Y., gun chargers, Cl. 11B, over $250,000.

The following contracts were announced for the week ended July 6, and are in addition to those listed here Aug. 6.

Republic Aviation Corp., Farmingdale, N. Y., pad assembly, hoisting fuselage, sling assy., adapter assy., jacking fuselage, Cl. 19A, 1,266 ea., $38,702.

Rheem Mfg. Co., New York, metal shipping container covers, Cl. 43, 120,000 ea., $42,402.

Royal Typewriter, Co., Inc., Dayton, typewriters, Cl. 25A, 300 ea., $55,071.

Safway Steel Products Co., Milwaukee, portable engine hoists, Cl. 19A, over $250,000.

Servomechanism, Inc., Mineola, N. Y., development of true airspeed and machine number computers and indicators, $63,230.

Shaw-Walker Co., Dayton, filing cabinets, Cl. 40A, 1,000 ea., $132,917.

Singer Sewing Machine Co., New York, sewing machines, Cl. 17A, over $250,000.

L. C. Smith & Corona Typewriters, Inc., Dayton, typewriters, Cl. 25A, 667 ea., $84,989.

Spencer Turbine, Washington, D. C., vacuum cleaners, Cl. 17A, 270 ea., $121,722.

Superior Steel Corp., Carnegie, Pa., steel sheets, Cl. 23A, 1 lb., $84,990.

Underwood Corp., Dayton, typewriters, Cl. 25A, 710 ea., $245,376.

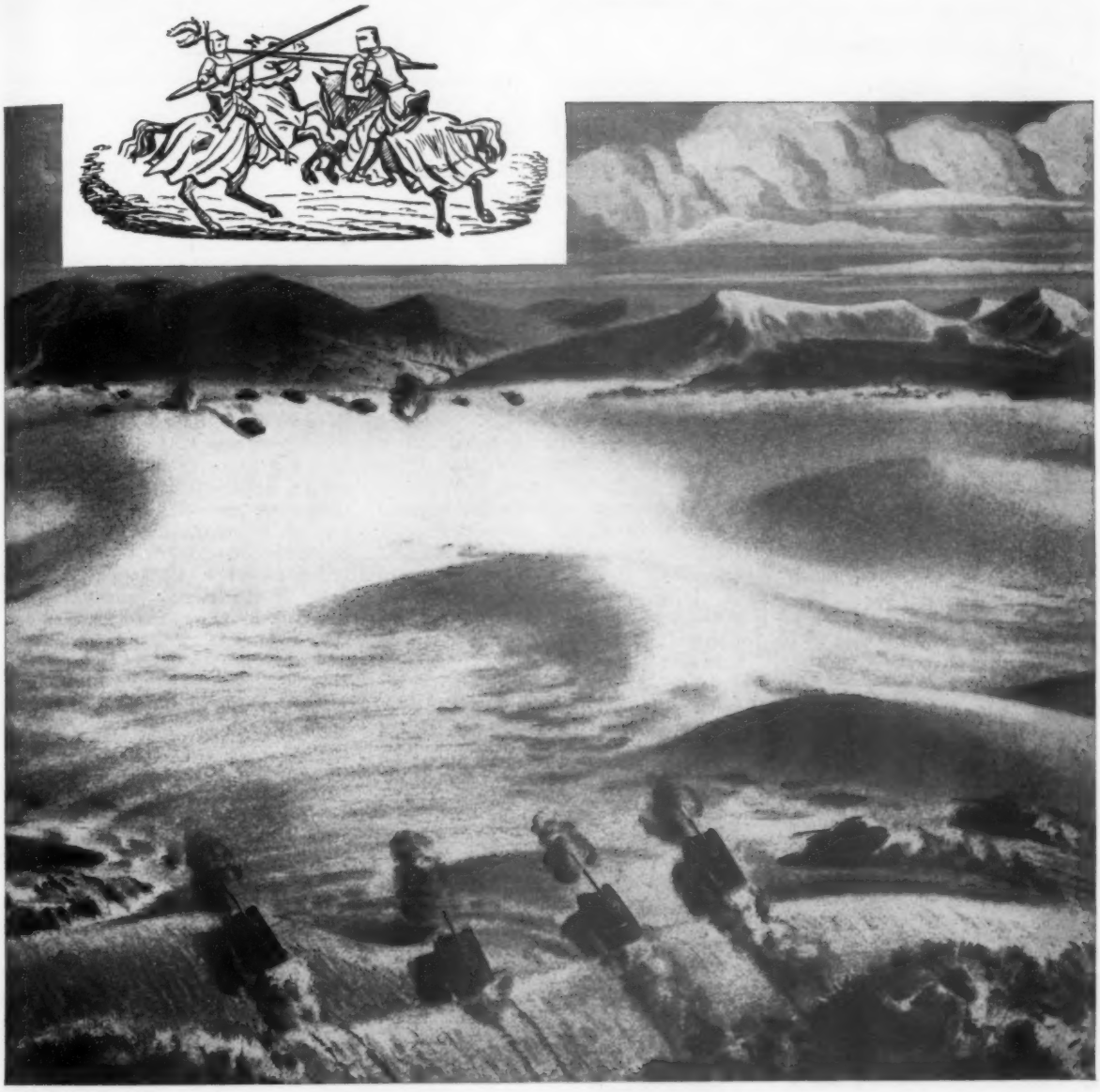
United Truck & Equipment Co., Inc., Baltimore jack assemblies, Cl. 19A, over $250,000.

Vinco Corp., Detroit, machinery and equipment, over $250,000.

Virtue Bros. Mfg. Co., Los Angeles, steel dining hall chairs, Cl. 40A, exceeds $250,000.

Wysong & Miles Co., Greensboro, N. C., squaring shears, Cl. 17A, 40 ea., $34,264.

Zenith Optical Co., div. of Polan Industries, Huntington, W. Va., focalscope, aerial camera, 322 ea., $91,936; lenses, Cl. 10A, over $250,000.



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AVIONICS

Miniature Relays Hermetically Sealed

Two new lines of miniature, hermetically sealed relays are being offered by Allied Control Co., Inc. and Neomatic, Inc.

► **Allied Line**—Allied, at 2 East End Ave., New York 21, says that its relays are sealed for operation up to 70,000 ft.

These relays, designated Type MH, are available in 2-, 4- and 6-pole, double throw, and meet the requirements of USAF Spec. MIL- R- 5757.

Seated height for all three sizes is 1½ in., and diameters are 2-pole, ⅝ in.; 4-pole, 1-1/32 in.; 6-pole, 1-3/16 in.

Temperature range for the standard type MHB is −55C to 85C; for the high-temperature type MHA it is −65C to 200C.

These relays will take vibration of 10 G, and shock of 30 G of 10 milliseconds duration as an operating condition.

Nominal coil voltage is 26.5 v. dc. The manufacturers say that the coils will take overvoltages of 23% for 8 hours without damage. Relays will operate at 18 v. dc. or less after exposure to any of the stated conditions of voltage and ambient temperatures, and will release at 13 v. dc. or less.

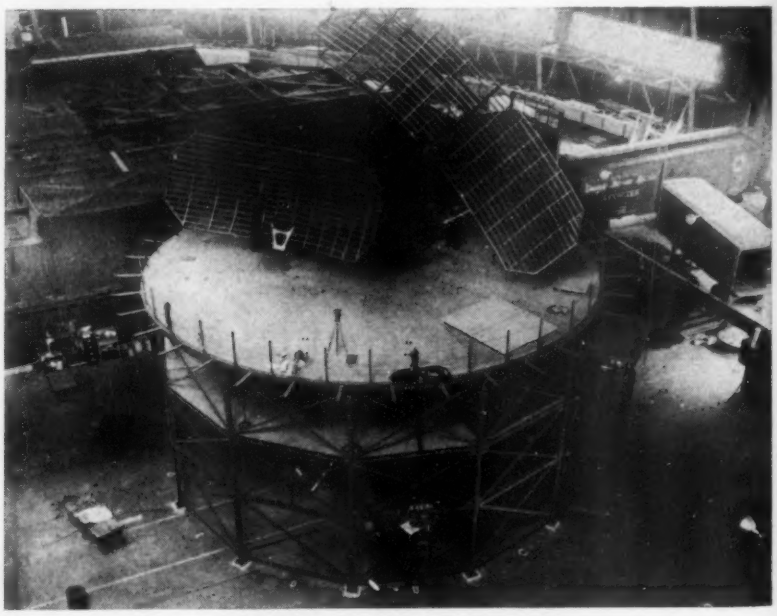
Minimum power requirement at room temperature is less than one watt. Life expectancy is over 1 million operations.

► **Neomatic Offers**—A similar line of relays has been announced by Neomatic, 11632 San Vincente Blvd., Los Angeles 49, Calif.

These relays were developed to meet space and performance requirements of military aircraft and guided missiles, radar, radio and telemetering devices. They weigh a little less than one ounce, and occupy about .85 cu. in. Standard seven-pin miniature plug-in base is used; if extra stability is needed in fastening, flanges are available. Or a solder lug seal can be substituted for the plug-in base when desired.

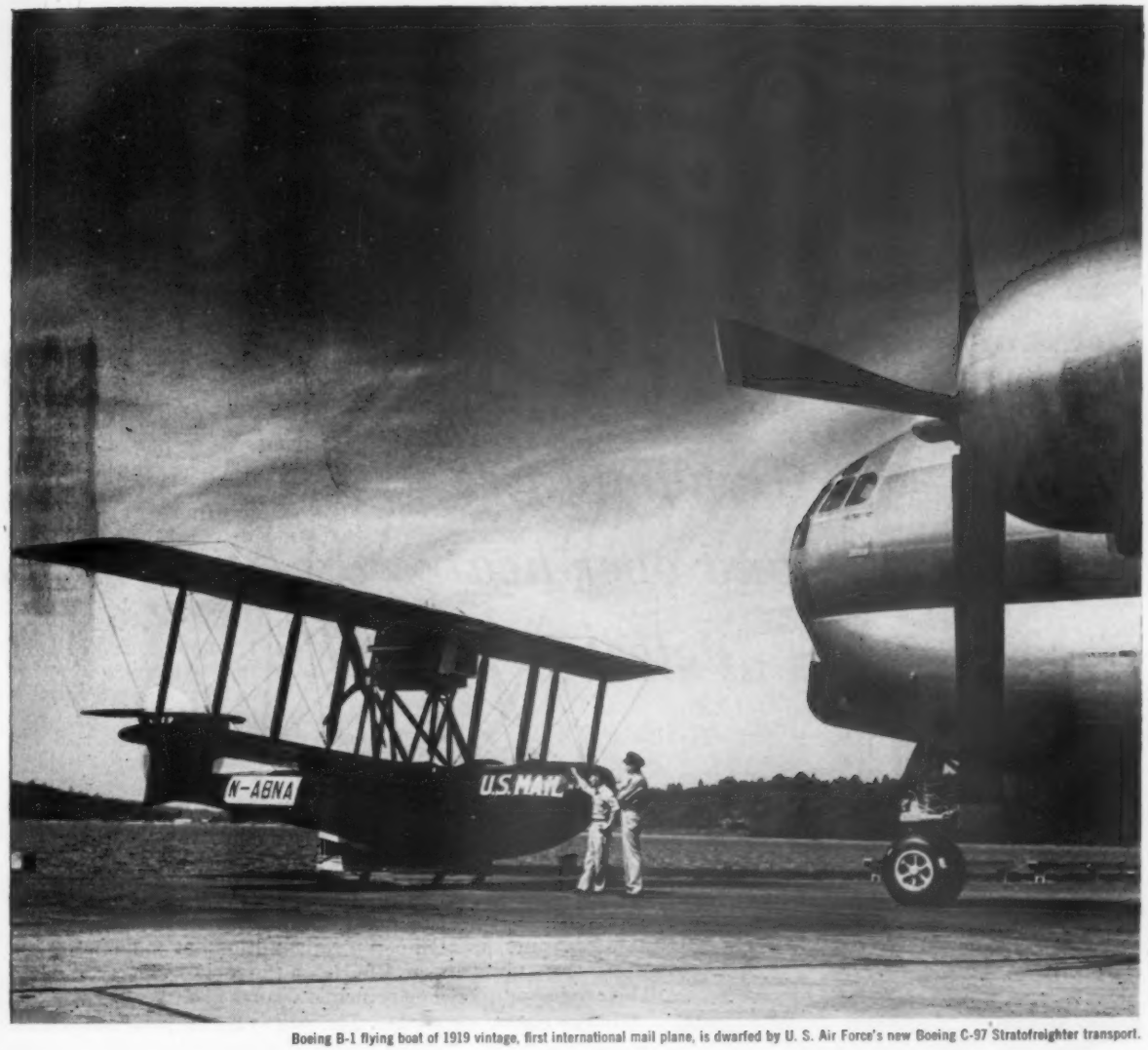
The relay line—designated the Series 5000 by the manufacturers—has been designed to take 20G vibration and more than 50G acceleration in any direction without affecting contact position.

One specific Neomatic model type, Model 5610 is an SPDT type with coils available in ratings from 3 to 72 v. dc., and resistances from 8 to 5000 ohms. Other pole arrangements are available,



PORTABLE RADAR TOWER

Shown here in advanced assembly stage at Goodyear Aircraft Corp.'s airship dock is this tower being built under subcontract from General Electric Co. and for ultimate use by USAF. Presumably a type of early-warning radar, the antennas and tower are designed for compact knockdown into small units for transportability. All erection tools required for ultimate assembly are shipped with the knockdown unit.



Boeing B-1 flying boat of 1919 vintage, first international mail plane, is dwarfed by U. S. Air Force's new Boeing C-97 Stratofreighter transport.

Out of the past comes the future

Boeing celebrates its 35th anniversary this year. Not old by ordinary standards; but in aviation, it's a whole age — virtually the age of flight.

During those 35 years, Boeing engineers and production men have seen — and played an important part in — the transition from stick and wire "flying machines" to today's comfortable, speedy, commercial transports. They have contributed to the nation's defense with a variety of military aircraft — from tiny fighters of the 20's to the B-17 Flying Fortress and B-29 Superfortress of World War II.

Today the company still pioneers — with planes like the huge Stratofreighter and Stratocruiser, the B-50 Superfortress, the 600-mile-an-hour B-47 Stratojet, the soon-to-appear B-52 eight-jet bomber and highly secret guided missile projects.

Boeing regards the experience gained during its first 35 years as a steppingstone toward continued progress — a solid foundation for meeting the challenges that lie ahead.

For the Air Force, Boeing builds the **B-47 Stratojets, B-50 Superfortresses and C-97 Stratofreighters;** and for the world's leading airlines, Boeing has built fleets of the new twin-deck Stratocruisers.

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Their dynamic operating principle assures positive operation . . . always accurate. *The shell is the temperature-sensitive element.* Through proper selection of alloy metals, Fenwal engineers design both temperature control, fire and over-heat detection for any aircraft need.

Fenwal heater controls can be used as control units or limit switches for cabin and de-icer heaters.

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Precise, Dynamic Fire Detection

as are other ratings. The relays may be obtained sealed with inert gases.

New relays to be soon available include double-pole types, ultra-sensitive and high temperature units.

Additional information can be obtained from Mr. Ross Welch at the manufacturer's address.

Low-Power Device Replaces Tubes

Computer Research Corp., Torrance, Calif. has announced the development of a vacuum tube replacement for certain medium-speed counting, amplifying and control applications. The device, known as the CRC Ferro-Resonant Flip-Flop, has no filament to burn out. It occupies about 0.1 the volume of a comparable vacuum tube. It is "immune to acceleration and shock and will operate for years without servicing."

It operates on about 10% of the power needed by an equivalent vacuum tube, and delivers 90% of the input energy as useful output. There is virtually no problem of heat dissipation in the device.

The Flip-Flop is being produced in octal base plug-in form, although it can be miniaturized or provided with solder leads.

According to the manufacturer, the uses for the unit include ring, gated or carry-type counting; highly sensitive, magnetic-amplifying switching; storing; delaying; pulse-shaping, as encountered in computer, telemetering, sonar, radar and other fields.

Small Rectifiers

International Rectifier Corp. announces a new line of hermetically sealed rectifiers.

The rectifiers are assembled in half-wave cartridges with current ratings from 300 microamperes up to 60 milliamperes. Individual cartridges accommodate up to 400 cell elements with dc. voltage ratings up to 8,000 v. per cartridge. By connecting a number of cartridges in series, voltages up to 250,000 v. can be obtained.

The assembly is rugged, says the company, and impervious to the effects of outside atmosphere. The units can withstand 100G accelerations. They can be operated in ambient temperatures up to 212F.

Outside diameters vary from 3/16 in. up to 1¼ in. depending upon current rating. These rectifiers are designed for such applications as airborne radar components and guided missiles.

Write the company for bulletins and other literature. International Rectifier Corp., 6809 S. Victoria Ave., Los Angeles 43.

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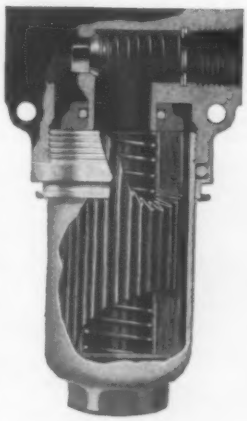

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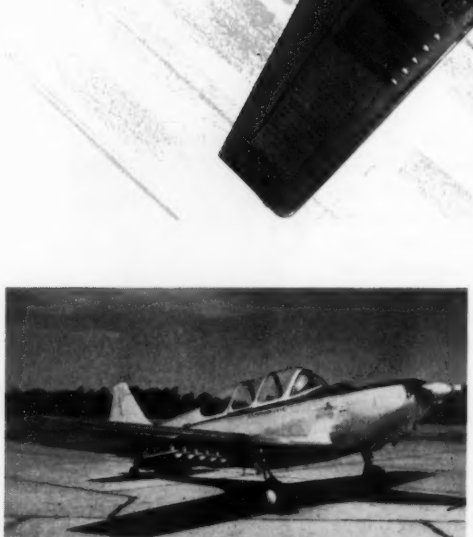

Ten intervalometer controlled 2.75-inch rockets are carried beneath the wings of the T-35.

With a mounting of two 30 Cal. machine guns and ten 2.75-inch rockets, and provisions for light armor plate, the T-35 TEMCO Buckaroo has become a highly maneuverable ground support weapon with all the flight control characteristics of the big fighters.

Machine gun installations at the torsional center of the wing in a completely submerged mounting provides more efficient cooling and better protection from the elements. Potential firepower has been demonstrated to the Ground Forces and tests showed an exceptionally accurate disbursal pattern. A 20-mm gun camera can be operated independently of actual firing, thus extending its use to observation and reconnaissance.

The Buckaroo offers a wide range of versatility and fills the need for a light ground support plane capable of making slow runs on targets. Outstanding among its many features are wing slots which give full aileron control up to and completely through the stalled attitude.

Designed and developed by a Military Plane Manufacturer, the TEMCO Buckaroo meets the Army requirements for a small maneuverable aircraft at the lowest possible cost, both in original price and maintenance.

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Texas Engineering and Manufacturing Co., Inc.

DALLAS, TEXAS

Plug Fouling Remedies Discussed

European Ignition Conference studies TCP compound and other means of eliminating spark plug failures.

By Nathaniel McKitterick
(McGraw-Hill World News)

London—More than 100 representatives of airlines, engine manufacturers, equipment makers, and government departments met in London's Hotel Savoy recently for the second annual European Ignition Conference.

The conference, now accepted as an annual feature by the European aviation world, was sponsored by Lodge Plugs Ltd., Rugby. As he did last year, Air Commodore F. R. Banks, Associated Ethyl Co., Ltd., held the chair for the two-day sessions.

The spark plug was the star of the show as the conference discussed lead fouling, ignition analyzers, plug design, plug servicing, cables and harnesses, low-tension vs. high tension, and jet ignition systems—problems that bother airmen the world over.

▶ **Lead Fouling**—The big news of the conference was blunted at the last moment as the U. S. government clamped the security lid on a paper scheduled to be delivered by E. L. Bass of Shell Petroleum's Thornton Aero Engine Lab. on a new fuel additive designed to lick the lead fouling problem.

Bass did explain that Shell and Rolls-Royce were now testing tricresylphosphate and had high hopes that this was the long-sought-for scavenger needed to reduce lead fouling. Tests are also going on in the U. S.

Discussion brought out that TCP plus a high boiling point scavenger (probably acetylene tetrabromide) were being added to normal aviation mix. Inference was that TCP plus a modifier made up 20% of the scavenger.

Tests at Thornton have been run on a single cylinder engine for 50 hr. with results showing "considerably more firing with TCP than without it." Further bench tests on a Griffon for 40 hr. showed no plug trouble with TCP, four plug failures in 26 hr. without it. A flight test in a Griffon showed only slight trouble up to 125-130 hours. And at that time the gap erosion was considerably below normal.

Rolls-Royce is currently testing TCP under intermittent running conditions.

TCP, R-R pointed out, does not attack metallic lead, only lead salt. The company warned that "a metallic deposit might reach the point where it became incandescent and caused pre-ignition."

Pratt & Whitney Aircraft told of its experience with the use of a primer as a scavenger. Excellent results had been obtained by running the R-4360 at 1000 rpm., auto-rich, and injecting primer for two minutes. P&WA admitted no official tests had been made, adding that operation was strictly one-shot—if it didn't work the first time, there was no use trying it on the same engine again.

Trans-Canada Airlines (which throughout the conference quoted Pan American World Airways statistics) claimed PanAm had been able to use an ignition analyzer to see fouling form and had used primer at such times to good effect. PanAm itself had no comment.

▶ **Ignition Analyzers**—The conference showed much enthusiasm for ignition analyzers, but the consensus was the device couldn't yet be relied on to determine plug life, though some engineers hoped the time wasn't far off.

Consensus of the discussion was that two weeks was enough training time for operation. The job of the analyzer was to answer: Where is the trouble and what is it? not What causes it?

TCA thinks analyzers will cut their unscheduled plug removals 60%. Last year out of 10,000 removals, only 800 were unserviceable. TCA quoted PanAm as saying analyzers had saved them $20,000 per powerplant per year. TCA's target is to save about $70,000 overall. Cost of TCA's Bendix equipment and British Thomson-Houston analyzer is only $50,000.

PanAm , agreeing with TCA, accented non-plug advantages of analyzers. PanAm now uses the device to trouble shoot its heating system, give prop-blade torque tests, and "determine radio interference."

▶ **Other Reactions**—BEA, which uses, as an experimental project, the British Thomson-Huston analyzers, complained about weight. The Viking has a 15-18 lb. limitation for an analyzer.

BOAC remained unconvinced. Engineers had asked top management to install Sperry analyzers in 1949 and been turned down. Now BOAC claims its record with the R-4360 is better than

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PanAm's despite analyzers, so it is showing lack of interest.

RAF has one flying unit on service trial. The Royal Navy has a unit installed in the wheel nacelle of a Sea Fury. RCAF is fully equipped.

SAS ordered a unit for trial a year ago and is still waiting for it.

R-R asked if an analyzer could detect a cracked insulator, or tell if a short had occurred in the distributor, at the elbow, or in the plug. Bendix admitted the device couldn't tell such things.

▶ **Plug Design**—Bland of Lodge told of a new plug, now testing at P&WA. Principle is to bring the cylinder closer to the sparking surface. Plug is designed for U. S. engines; it can be either massive electrode or fine wire. In the latter case, Lodge says, considerable platinum can be saved.

The discussion brought out that, as in the U. S., mass electrode plugs were gaining more and more popularity at the expense of fine wire.

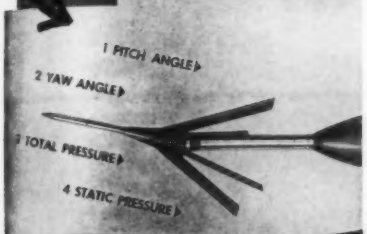
BOAC made the statement: "Erosion is a very minor point in spark plug life in our experience—except on the Merlin." TCA, BEA, SAS all agreed. Most lines were still aiming at scheduling plug removals at 200 hr.

Here are further observations on plugs:

- R-R still favored fine wire plugs because, "We have proved they have a higher pre-ignition rating."
- KLM found that erosion in fine wire plugs was low at first but increased progressively. Erosion in massive electrodes started high and leveled off about 300-400 hours, became negligible after 500 hours.
- TCA confirmed KLM's statement saying that it had held off massive electrodes because of the carrier's cold weather routes. Later tests on an R-1830 showed that in cold weather there was no difference between the two types, so TCA uses massive electrodes exclusively in non-Rolls-Royce engines.
- KLM noted that it used fine wire plugs in the rear row of its DC-6 engines and massive electrodes in the front because the latter didn't stand up in the rear of DC-6 engines.
- Engineers agreed that they couldn't ask a plug manufacturer to make a fine wire or massive electrode plug to fit all engines.
- Lodge commented that they had run several tests on substitute materials for platinum in fine wire plugs but "found the evidence still supported platinum over the rest."
- SAS and others believed that nose cracking was about the number one plug design headache.

▶ **Cleaning Agents**—Royal Aircraft Establishment described its newest cleaning agent which turned out to be a very close duplicate of DuPont's process de-

4 features



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scribed at the Champion conference last fall.

RAE's formula is based on ammonium acetate, heated to 80C in a rotating drum, with from 12 to 64 plug holes in it. Device removed non-metallic deposits in an hour, though longer exposure won't hurt the plugs. Sandblasting is still advisable, but RAE hopes the process will eventually make this step unnecessary. The compound will not yet attack metallic lead or carbon, however.

▶ **Ignition Cables**—British ignition cables were roundly condemned, W. T. Henley, Telegraph Works Co., Ltd., taking the brunt of the criticism. R-R claimed that Packard's 2668 cable was still the best, and accordingly, was reproducing it here for British engines.

New cable materials were thoroughly discussed.

RAE doubted that Packard's 2668 was the answer for high temperatures. It thinks nylon sheathing might do up to 150C. Teflon was better but too expensive. Silicone rubber had a big drawback in that it was attacked by paraffin and gasoline.

Henley thought the mechanical properties of silicone rubber were very poor. ("Crumbled, couldn't be wound around corners.") The firm added that nylon fibers didn't have enough moisture resistance. Company was experimenting with a cellulose lacquer to avoid lacquer cracking. Cable will consist of stainless steel conductors, rubber insulation, cotton sheathing, and cellulose lacquer. Henley has also installed U. S. cable making machines and is starting a small production of U. S. types.

Teflon came in for some criticism from TCA "because its abrasive qualities may cause trouble," and from RAE "because of poor voltage performance (breakdown figure of 5000v.) and because of their higher voltages and temperatures."

▶ **Magnetos**—Magneto discussion centered around two points: trouble with magneto venting and servicing problems.

Several lines had had trouble with pressurized systems to ventilate magnetos. All were scrapping the pressurizing systems.

TCA reported trouble on 2800s and 4360s. The airline reported that PanAm had done away with the pressurizing system and was tapping the turbosupercharger with a fixed lead to the blower.

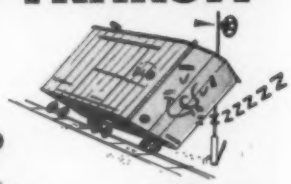
BOAC said they hadn't had much pump trouble, but weight considerations led them to follow PanAm's lead.

KLM reported that pressurizing on their Convairs was causing a lot of trouble, particularly in the bearings.

SAS has switched to constant bleed after bearing trouble and oil leakage experience with pressurizing.

Bendix, whose equipment was under

Stop
paying for
"IDLE TIME
IN TRANSIT"



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BELL Aircraft CORPORATION

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fire, claimed that the altitude valve was causing most of the trouble.

Rotax (British magneto builder) said that sealing up to 1000 hr. was now possible on Bristol and Rolls-Royce engines. British coils are giving a lot of trouble.

BEA claims that only 20% of its magneto failures were due to control breaks; 30% to coil failures. BEA's normal magneto run is 1000 hr, unsealed.

SAS overhauls mags at 1200 hr., cleans points at 600 hr.

KLM overhauls mags at 1200 hr., does not service points.

BOAC services points only at 500 hr.

TCA said they had had only two coil failures on a Bendix magneto in six years; while Rotax mag coil failures were hitting new highs.

Rotax offered "hotter British engines" as one explanation of its coil failures. Admittedly British materials and workmanship, both in wire drawing, enameling, and in winding, were way below U. S. standards.

▶**Low Tension System**—Rotax asked: "Why don't British airmen plug for low tension systems?"

Rotax claimed that the high tension harness was an "operator's nightmare"; that low tension harnesses were easily replaced—only had short high tension leads; totally enclosed magneto and distributors were moisture-proof; weight (measured on a Bristol Centaurus, 18 cylinder engine) was only 15 to 20 lb.

Bendix (Suntilla division) followed with an eloquent (and lengthy) defense of the same theme; quoted statistics on a Panagra test using R-37s and RB-19 plugs, two engines on low tension, two on high tension. Results after 525 hours: L.T. erosion .001/100 hr; H.T. .0035/100 hr. Fine wire plugs were left in up to 865 hr. with the erosion rate still at .001. Massive electrode plugs were left in up to 1000 hr. with erosion rate rising to .0013.

Firm quoted American Airlines experience in switching all DC-6 and Convairs to low tension this spring. On the DC-6, delays per 1000 hr. were cut 43.6%; plug removals per 1000 hr. were cut 39.4%; all other difficulties were cut 24.4%.

On the Convairs, delays per 1000 hr. cut 39.5%; plug removals cut 47.7%; all other difficulties cut 33.3%.

Welch of Bendix was surprised that British operators thought erosion a minor difficulty. He thought it second to lead fouling in the U. S.

Ministry of Supply said that L. T. was not contemplated for service aircraft, and only Bristol was installing it in the civil field so far.

The chairman of the meeting said that acceleration at high altitudes, not relighting, was the real problem facing jet engineers now.

Aircraft design details in 3 dimensions

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HERE is a guidebook for aeronautical designers, engineers and maintenance men, giving a graphic three-dimensional presentation of design details on all phases of aircraft, including a variety of both foreign and domestic plans. The book's 788 illustrations show you *designs as they really exist*, enabling you to understand the essential ideas in a design without pondering over pages of complex explanations and various two-dimensional drawings.

With each chapter covering an area of aircraft design, such as wing, power plant, landing gear, etc., the book is an *encyclopedia of design details* in which you can look up *exactly the aircraft part on which you are working* and find out how other designers have handled a similar problem. Though primarily visual, the manual explains details embodied in the various designs, as well as giving tabular data on many aircraft computations, measurements, etc.

AIRCRAFT DESIGNERS' DATA BOOK

By *Leslie E. Neville*

Curtiss Wright Corp., Former Editor, Aviation

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THIS book enables the aircraft engineer embarking on a new design problem to see clearly and as readily as possible precisely what has been done both here and abroad on the specific aircraft part he is designing. It presents amazingly clear three-dimensional drawings that show design details for a variety of aircraft, engines, and accessory equipment. First published in WINGS Magazine and AVIATION, these three-dimensional drawings were acclaimed enthusiastically by engineers who referred to them. Now they are available, together with scores of hitherto unpublished design details, *in the first book of its kind for aircraft designers.*

Includes design details for land planes and seaplanes of both metal and composite construction, grouped for easy reference in terms of power plants. Such military planes as the Messerschmitt ME163, the P-39, and the Republic Seabee are shown, and several German and Japanese designs are compared for efficiency and practicability.

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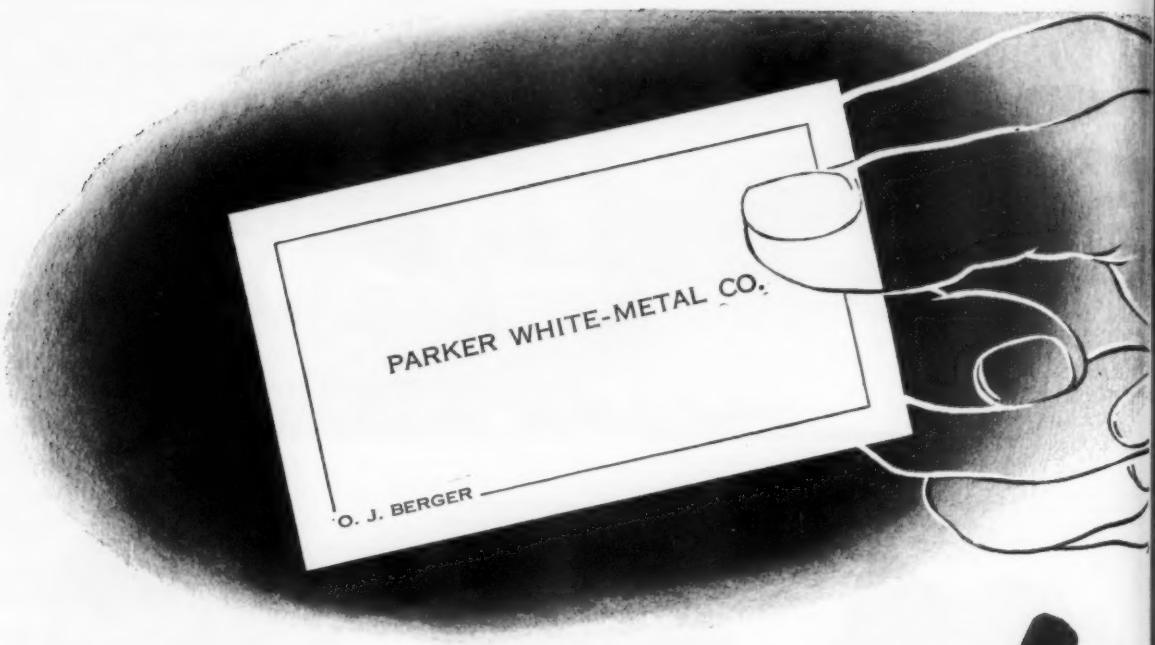

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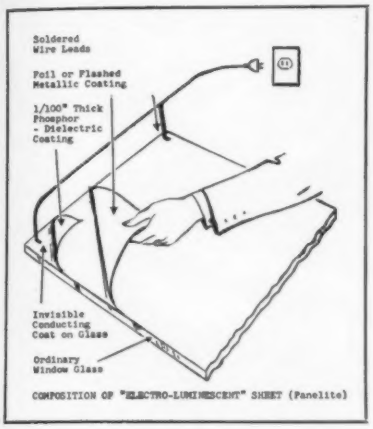
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Invisible Conducting Coat on Glass
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COMPOSITION OF "ELECTRO-LUMINESCENT" SHEET (Panelite)

Electroluminescence: New Word in Lighting

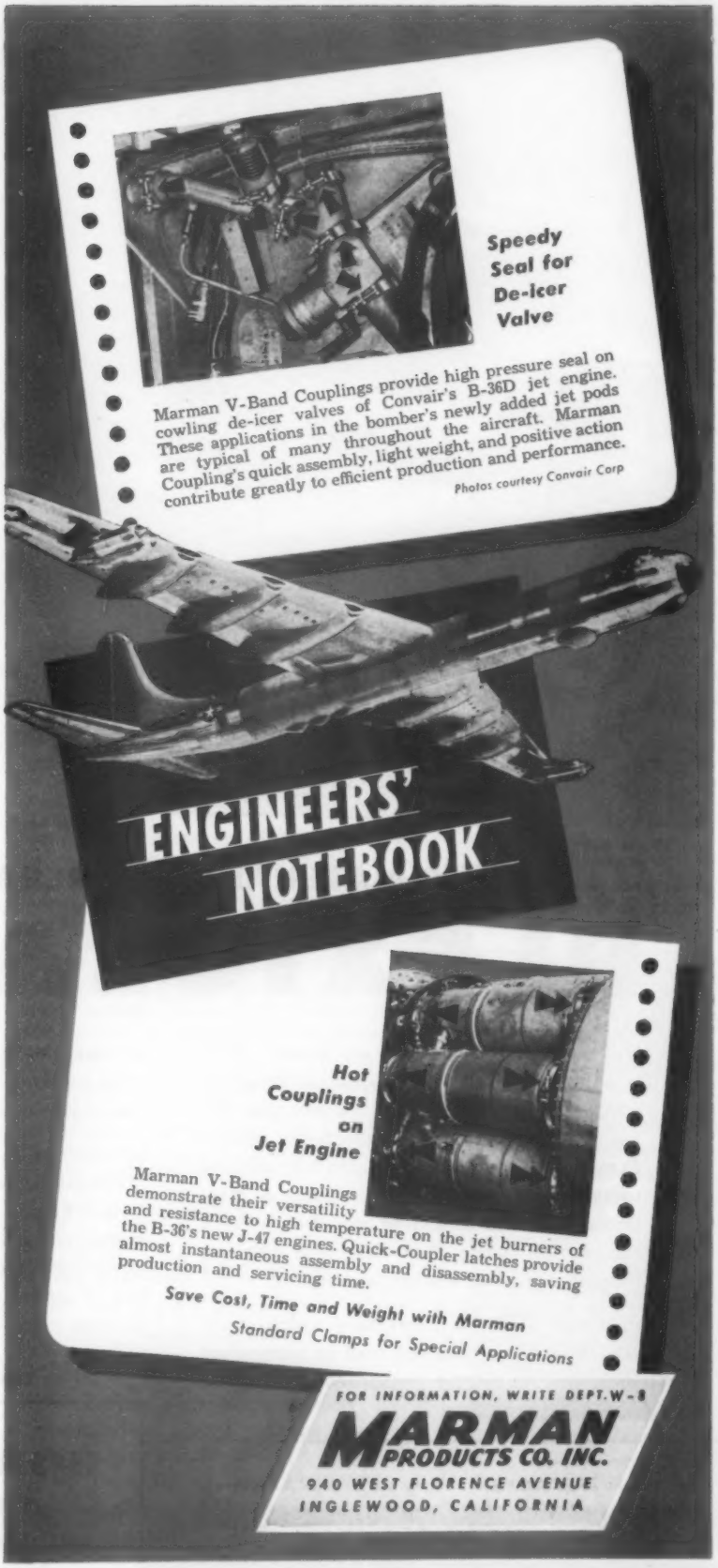
A completely new method of lighting, as revolutionary as the fluorescent tube and with many potential aeronautical applications, such as illumination of instrument dials, emergency exits and the cabin has been announced by Sylvania Electric Products, Inc.

The new lamp, called "Panelite," is nothing more than a piece of window glass so treated that it emits an appreciable amount of light when properly connected to ordinary 110 v., 60 cycle house current. Phenomenon upon which the conversion of energy to light depends in this case is termed electroluminescence.

• **Light Weight**—The "lamp" weighs hardly any more than an equivalent dimension of untreated glass. Total thickness of materials creating luminescence is about 1/100 in. Moreover, indications are that the process may be applied to plastics as well as glass, thus further reducing weight.

• **Economy**—Current consumption of Panelite the size of an instrument or clock face is about 1/25 of a watt. A 4 x 6 ft. panel consumes less energy than a 25 watt bulb. Light output at these consumptions is approximately 0.1 foot-lambert.

• **Longevity**—Since there are no filaments to burn out, life of the lamps


Speedy Seal for De-Icer Valve
Marman V-Band Couplings provide high pressure seal on cowling de-icer valves of Convair's B-36D jet engine. These applications in the bomber's newly added jet pods are typical of many throughout the aircraft. Marman Coupling's quick assembly, light weight, and positive action contribute greatly to efficient production and performance.
Photos courtesy Convair Corp
ENGINEERS' NOTEBOOK
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Marman V-Band Couplings demonstrate their versatility and resistance to high temperature on the jet burners of the B-36's new J-47 engines. Quick-Coupler latches provide almost instantaneous assembly and disassembly, saving production and servicing time.
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PLEXIGLAS II canopy on the U. S. Air Force's Northrop Scorpion F-89.

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PLEXIGLAS II meets Army-Navy specifications (MIL-P-5425) for material used in transparent enclosures on current pressurized aircraft. For the planes of the future, Rohm & Haas laboratories are working to raise the quality of transparent plastics to even higher levels.

In order to help you make the best use of PLEXIGLAS II, we have prepared a Handbook for Aircraft Engineers. Just off the press, this 66-page manual contains detailed technical data on the use of PLEXIGLAS in the design and installation of aircraft enclosures. Write to us for your copy.

CHEMICALS FOR INDUSTRY

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Canadian Distributors: *Crystal Glass & Plastics, Ltd., 130 Queen's Quay at Jarvis Street, Toronto, Ontario, Canada*

should be indefinite, according to the maker. Practically, indications are that a life span of 2-3 years may be expected from the units.

• **Coolness**—For most applications, Panelite is the coolest of all light sources, Sylvania says, since it does not comprise cathode or filament concentrations. Temperature of operation is unnoticeable to the human hand. As brightness is increased with boosted current, slight temperature rises may be expected.

• **Versatility**—The applications of Panelite are as limitless as are the uses of glass or plastic. The only additional requirement being to bring in a power supply.

▸ **What Makes It Glow**—The lamp is essentially a luminous condenser consisting of a special sheet of conductive glass (or plastic) on which is placed a "phosphor-dielectric" coating and a layer of vaporized aluminum. As the "condenser" charges and discharges with successive reversals of alternating current the electrons flow through the dielectric and excite the phosphor material suspended in it. The result is light which assumes full brilliance the instant current is applied.

Sylvania believes that the simplicity of the lamp is a feature attractive to the aviation industry. Moreover, since the light output is a function of voltage and frequency, aircraft having 400-cycle current available would achieve relatively high light outputs from Panelite. Brilliance of the light may be easily controlled with a rheostat and light intensity may be increased by incorporating a simple transformer in the feed-in circuit.

Only color currently available commercially is a brilliant green. Other colors soon to be made available are: white, yellow and light blue.

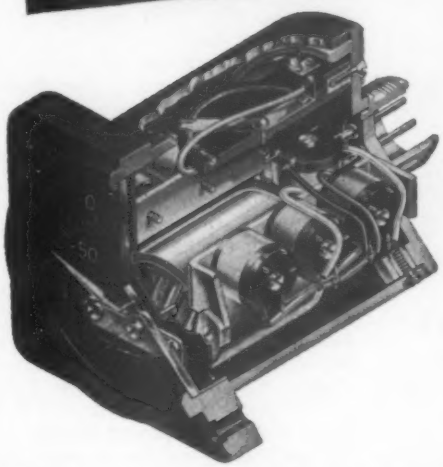
Electricity, as a light source, started with incandescent lamps, known as point sources. Then came arc discharge lamps, as exemplified by the fluorescent tube, dubbed line sources, although, of course, they may be curved or coiled into many geometric shapes. Now, for the first time, says Sylvania, there is available an area or plane source of light in electroluminescent Panelite.

Magnesium Wheel

A new magnesium wheel, capable of carrying 60,000 lb. has just been developed for the USAF's speedy B-47 jet bomber.

Perfected by the B. F. Goodrich Co., the 56 x 16 in. wheel incorporates a new design and has supported a 325,000-lb. load in tests, giving it a 5–1 safety factor according to the manufacturer. The wheels mount tires carrying 240 lb. pressure that are also capable of carrying a 60,000 lb. load.

How EDISON Indicators Save 35 Pounds



EDISON electrical resistance temperature indicators were recently specified for cylinder head indication on a new type of four-engine transport. In this installation, two dual indicators and eight bulbs were used . . . at a weight saving of *35 pounds* under the thermocouple system formerly employed.

Weight economy is only one of the many features associated exclusively with EDISON instruments. Of special interest to maintenance engineers is the ability of EDISON indicators to adapt themselves to *any* temperature measurement application. The EDISON ratiometer movement is standard for all indicators whether used for cylinder head, oil, air, heating duct, etc. This standardization permits the temperature range in any given indicator to be changed merely by substituting a new dial and a few low-cost resistors.

It will pay you to investigate this proven way to save weight and cut maintenance costs. For complete information on indicators, send for our new Bulletin #3023. And for matching resistance bulbs, ask for Bulletin #3016.

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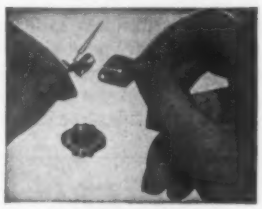
Scale is expanded at center of range where operating temperatures are located.



RUGGED, TROUBLE-FREE CONSTRUCTION
Rotor is just a magnet on a steel shaft — No delicate moving coil.

EASE OF OVERHAUL
No special tools—No delicate hairsprings—Jewels easily replaced.

EASE OF CALIBRATION
Merely move the contact on a rheostat—No coil calibration.

YOU CAN ALWAYS RELY ON EDISON

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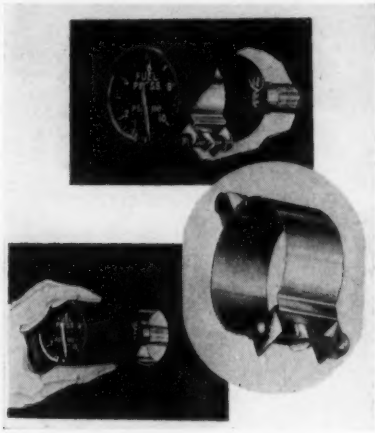

Clamp Speeds Work

Speedier installation and servicing of aircraft instruments is promised through use of a new mounting clamp perfected by Marman Products Co., Inc.

Instruments now can be installed or removed from the dial (pilot's) side of the panel. The clamp is installed behind the instrument panel and encircles the instrument cutout. It is secured by a screw inserted from the dial side. Another screw on the face of panel tightens or loosens the clamp which grips the instrument body. All that is required to remove the instrument is to loosen this actuator screw (from dial side), then pull the instrument out of the panel and disconnect whatever leads are attached. The clamp is designed to conform to Specification MIL-C-5818 and is installed in accordance with Spec. MIL-C-6822.

Besides time-saving features, clamps of this type permit closer spacing of instruments, according to instrument engineers. They say they are particularly suitable for engine gauges of the type shown in the photo above—those without square, four-holed mounting flanges. It is elimination of protruding mounting flange and the diagonal spacing of the clamp screws which permits instruments to be spaced closer. Unless a coverplate is used over the main panel, instruments project slightly from the panel as shown, the threaded edge providing a hand grip permitting the gage to be pulled out. Marman's address is 940 W. Florence Ave., Inglewood, Calif.

System Indicator

A remote-reading three-position indicator suitable for a variety of aircraft applications has been placed on the market by the Keystone Watch Case division of Riverside Metal Co.

The device consists primarily of a rotating card which exhibits one of three printed symbols at an observation window on the instrument. The card is rotated by two solenoids which draw it up or down to either of two extreme positions. When neither coil is energized, the spring-balanced cylindrical card returns to neutral position, exhibiting the third (middle) symbol.

The indicator can be used to report

High signs for 89's

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During World War II it was the P-61 Black Widow. Today it's the deadly Scorpion F-89—fast, heavily armed, electronic-search equipped—the standard all-weather interceptor of the USAF.

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Northrop Aircraft Inc.,

PIONEER BUILDERS OF NIGHT

conditions in various aircraft systems where operation is adaptable to a three-position check, such as High, Low, Medium, for example. Slightly larger than a cigarette lighter, the unit weighs 2½ oz., and is designed to meet severe operating conditions in aircraft.

The maker says the device already has been specified as a landing gear position indicator and for reporting de-icing fluid level and cabin air pressure. Riverside Metal Co., Riverside, N. J.

Air Photo Tool

An aerial photo slide rule, providing quick answers to problems arising in photo reconnaissance work, is being marketed by Pickett & Eckel, Inc.

While designed primarily for Air Force use, the rule is considered by the firm to be highly useful for commercial aerial photography activities. The time-saving device, eliminating need for reference tables and old style calculations, was developed by AF's Aerial Photo Division. With five scales, the unit on one side solves aerial photography problems; reverse side is used for general computations. It gives fast answers to such problems as:

- **Comparative size** between objects on ground and in photograph.
- **Area of land covered** by one exposure of film at a given focal length, altitude and film size.
- **Ground feet covered** in flight per inch of photograph.
- **Exposure time** in seconds required to cover image while plane flies at given mph., given height and camera set at given focal length.
- **Actual size of ground object** appearing in photograph.

The rule is available in 10- or 6-in. models, priced $22.25 and $12.25 respectively. Pickett & Eckel, Inc., 5 South Wabash Ave., Chicago 3.

Small Avionic Mount

Smaller all-metal shock mounts aimed at meeting increasingly stringent weight and space restrictions being placed on aircraft avionic equipment have been added to the Met-L Flex line.

The newest addition is a No. 1 size cup unit mount built to conform with JAN-C-172A specifications. It supplements the larger No. 2 size metal unit mount, Series 7002, presently produced in quantity by Robinson.

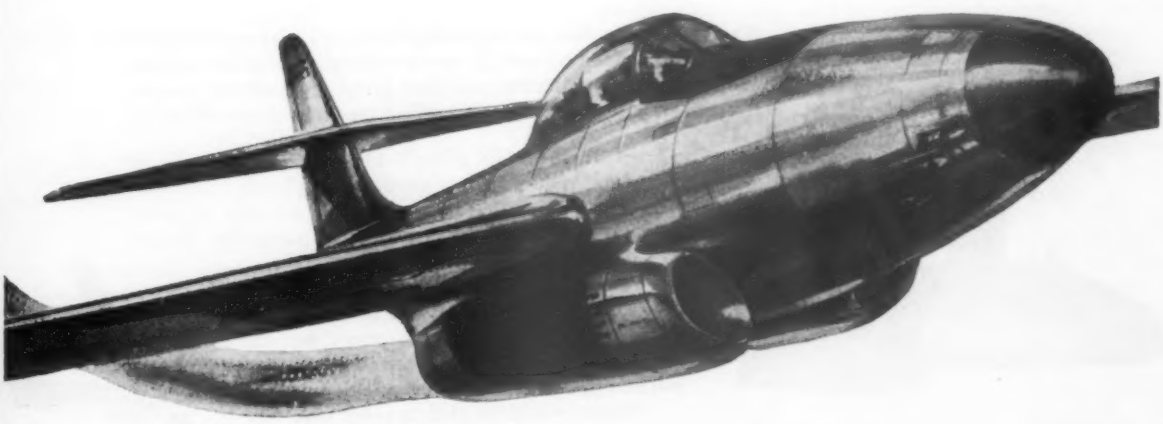
The new, smaller mounts come in five load capacities ranging from ½ to 10 lb. Minimum ultimate strength per unit is 700 lb. According to the firm, vibration isolation performance exceeds military spec requirements through temperatures ranging from −130 to 347F.

Robinson Aviation, Inc., Teterboro Air Terminal, Teterboro, N. J.

ALSO ON THE MARKET

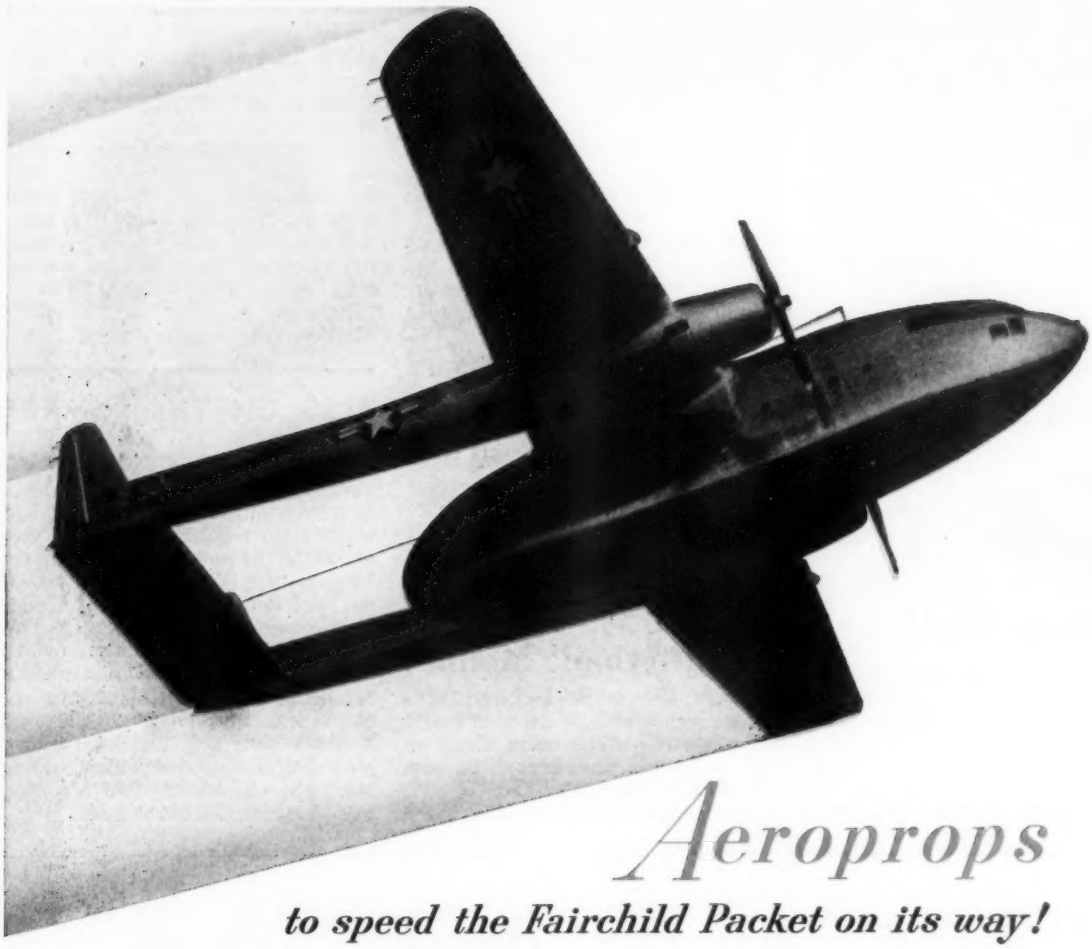
Tough, long-lasting markers for identifying wire and cable are made of rigid plastic sheet (vinylite), have clear plastic overlay to protect lettering—in tag form (with cord) or sleeves (1/16-in. dia. minimum) to fit any shape. Actioncraft Products, 8 Sagamore Hill Dr., Port Washington, N. Y.

Spotlight for airports, loading areas, etc., is designed to provide 100,000 candlepower with only 300 watt rating, gives long-throw, narrow floodlighting beam. Stonco Electric Products Co., 489 Henry St., Elizabeth 4, N. J.



Hawthorne, California

AND ALL-WEATHER FIGHTERS



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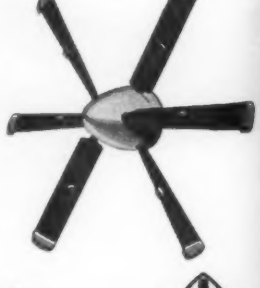

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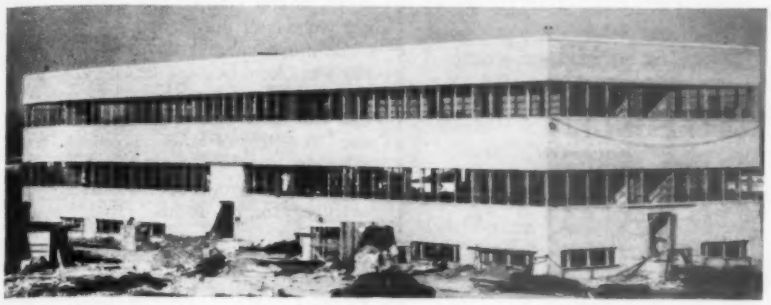

THE BUILDING—A symbol to Behncke, but a source of dissatisfaction to the pilots.

Revolt of the Pilots—II

Curtain Drops on One-Man Show

Behncke's preoccupation with a 'home' to give union of 'impetuous' pilots stability helped spark rebellion.

By William Kroger

Airline management seeking a clue to future labor relations in the abrupt change of leadership in the Air Line Pilots Assn. is noting one significant point: The revolt of the pilots was not against David L. Behncke the champion and protector of pilots, but against Dave Behncke the Labor Leader one-man show.

With the end of dominance of the union by a single personality, the airlines may find a better organized ALPA; one not necessarily easier to live with, but one perhaps easier to work with (AVIATION WEEK Aug. 6, p. 13).

Management will find, as the revolt is examined, that the pilots' quarrel with Behncke is on things left undone as well as things done. Some in management will recall that pilot resentment against Behncke long has been growing. And Behncke had been warned.

▶**"Impetuous" Pilots**—Behncke remembers, he says, walking down a street in New York several years ago and meeting an airline president. After inquiring of the state of the union, the airline president said, relates Behncke, "ALPA will soon destroy itself by the pilots' impetuousness."

Then there was the 1948 convention when, for the first time, Dave Behncke had opposition for the presidency, from American Airlines Captain W. H. Proctor. Behncke won by a substantial margin. But it was the cloud in the sky that foretells the storm. It was only the younger element in the union that re-elected him. Behncke's old friends, his long-time associates, already had started turning from him.

And Behncke's wife, an acknowledged partner in his lifework of building ALPA, advised him after that convention to hurry and complete his "master plan," else it would be too late. That plan, Behncke explains, was a two-fold one.

• **Departmentalize and decentralize** ALPA so others could have the major responsibility for operating it.

• **Complete** the new ALPA headquarters building.

But the pilots couldn't wait. By Behncke's creed, they have been "impetuous" in taking control of their association. To understand why that is, you have to understand Behncke's attitude toward pilots. He explained it to AVIATION WEEK in the only exclusive interview he has granted since the crisis in ALPA affairs.

▶**The Behncke Story**—Seated in the homey living room of his slightly old-fashioned, tan brick bungalow on Chicago's South Side, four blocks from union headquarters, Behncke turned his thoughts back to the origins of the association. Pilots are swell fellows in the cockpit, he began. "Everything I have said about them, God bless them, is true. But outside of the cockpit they can't run their own affairs.

"Pilots aren't business men. Their wives handle their business. They're not home most of the time, and when they come home they are too tired to think about this bill or that one. It's the wife who pays the bill. It's the wife who says maybe they ought to buy that little piece of land against the day that old Joe can't fly anymore.

"They say ALPA has been a one-man show. It had to be. Pilots aren't business men. They think they can run the union, but outside the cockpit they don't know anything."

Because Behncke sincerely believes that, he has been deposed and ALPA turned over to highly-educated pilots who say the times have passed Behncke by. Requirements today are so high that pilots have skills and knowledge undreamed of in Behncke's days as a pilot, and either unrecognized or unappreciated by Behncke today.

Because Behncke sincerely believes that pilots cannot run the union, he was loath to loose the strings binding him to a 24-hour working day for pilot welfare, and to personal supervision of the finest detail. Rather than dispute that ALPA for long was a one-man show, Behncke glories in that as the most successful approach to the organizational problem.

Because ALPA was a one-man show, the things left undone by Behncke were myriad. His ALPA routine was to line up a list of projects, say a dozen, give each a priority and then work on them in order. By the time number 12 became number 1, there were perhaps 12 more awaiting attention. Things were constantly being left undone.

In recent years it had become worse. The main reason was the new ALPA building.

▶**Permanence of a Home**—David Lewis Behncke, in a way that only an egoist could fully understand, is a humble man. In the trappings of a union leader he is haughty and proud of the association he alone built from nothing. In his home on a quiet, sultry July night he was an aging man, in his own way wise, and impressive in his belief in the simple virtues: faith in God, love of country, respect for womanhood, loyalty to your associates and employer. His sense of values begins with the home, the symbol of permanency in life.

It is as reasonable that Behncke cannot understand the new ALPA leadership, which according to his lights has been "disloyal," as it is that that leadership cannot understand him because of his obsession with a home which many of them say ALPA not only cannot afford, but does not necessarily need to operate efficiently.

It has been said that Behncke is building that three-story white building hard by Chicago's Midway Airport with his own hands. An exaggeration, of course. But he does say he sketched the floor plan after the architect had failed. He does say he had to be on the job every day to superintend the construction. "Owner's decision, they call it, and if I'm not there to make the decisions, several crews will just stand around."

Completion of the building was essential to completion of his grand plan. To one with David Behncke's values, an organization has no permanency until

its members can plant their feet solidly on their own floor under their own roof.

► **Signs of Trouble**—When Behncke was at the building he could not be at the present union headquarters a few miles away. And that is when things increasingly became left undone.

He says he thought he had provided for his day-to-day absences. He had, he explains, turned over to Executive Vice President Clarence N. Sayen management of the office staff, several important contract negotiations and other vital matters. Behncke complains that Sayen, instead of handling his assignments, connived to get his boss' job. An impartial seeker of facts must discard that theory; connivance is too harsh a word for what developed, and it seems evident that Sayen was not a part of any pre-arranged mutual agreement among pilots to oust Behncke.

Trying to trace the origins of his union's actions, Behncke last month told the visitor in his living room that he knew something was going on, but it was only after the tumultuous executive board meeting that things fell into a pattern for him.

Now he professes to see a plot to supplant him that dated back at least to the last biennial convention in November, 1950. Illness had already beset him, the physical and nervous breakdown that has tormented him since. He was occupied with his building and plans for the convention, he recalled, so he turned over to Sayen preparations for the important American Airlines Presidential emergency board hearings.

In Behncke's view, Sayen failed to prepare adequately. After the convention, although still ill, Behncke had to move into the hearings himself, he claims. He directed the hearings by remote control from his bed in the Plymouth Hotel in New York, he says. And while he was sick in bed, "Jerry Wood, Slim Babbitt, Red Foster and this fellow Sayen caucused in a room right below me." Jerome E. Wood, Eastern Air Lines, is ALPA first vice president. W. T. Babbitt, EAL, and A. F. Foster, TWA, are vice presidents. Behncke saw in such a meeting a conspiracy directed against him.

(Babbitt and Foster both denied vehemently last week that there had been any "caucus" or conspiracy among the ALPA vice presidents. They said they had come to New York at Behncke's request to aid him in quelling an incipient American Airlines pilots' revolt against Behncke. Babbitt, at Miami, told AVIATION WEEK the meetings were held with Behncke, were intended to help him retain his leadership, and did so. Foster, in New York, agreed.)

After the hearing, Behncke returned home to rest. He had hardly returned to his desk at the office, he relates, before Wood, passing through Chicago, telephoned. According to Behncke, Wood said he was "coming up to headquarters and straighten things out." If Behncke objected, he says Wood told him, they'd pull a quickie convention and recall him.

"I told him that couldn't be done under the by-laws," Behncke says, "and he said to me 'they have ways.'"

► **Out in the Open**—Behncke could hardly have been surprised, then, at what happened when he summoned the executive board several months later. Under ALPA by-laws, the executive board can only be called to discuss a definite agenda circulated in advance.

The purpose of the June 12 meeting of the board was to consider the report of the emergency board in the American Airlines case. But in Behncke's words, "They took over the meeting, you've never seen such a mess. Rules of order were thrown out. I kept trying to point out that they had come to discuss contracts, but they wouldn't listen."

Someone offered from the floor a resolution to "survey the general operation, organization and business affairs of the association." The resolution carried and from that point the revolt was out in the open.

A five-man investigation committee was appointed, and it reported back at a second executive board meeting July 9. Acting on a recommendation in the report, a three-man "interim committee" was named to manage the association. Behncke was to remain as president, but the committee would perform his functions. The executive board also voted to call the board of directors into session to consider changes in the by-laws which would implement other recommendations in the report.

The directors met July 17, approved the amendments to the by-laws, and voted to "recall" Behncke as president and continue his $15,000 annual salary for life. With the directors voting the total active ALPA membership in the local councils, the count was 5,560 for recall to 269 against. The directors then elected Sayen president.

Behncke claims the directors' meeting was illegal because he had adjourned the executive board before it voted to call the directors. This is disputed by the minutes of the executive board meeting. As the directors meeting was illegal in his view, Behncke has refused to recognize his recall. He refused to vacate his private office and turn over the keys, and for more than a week had private detectives guarding the office.

► **Into Court**—Meanwhile, court action began. It started when four pilots presumed to be adherents of Behncke sued the directors for $2 million. Agreement was reached that this suit be dismissed, but Behncke's attorney filed a motion to intervene, keeping the suit alive.

The directors asked the court for an injunction restraining Behncke from interfering with the union. Then Behncke withdrew his petition to intervene in the $2 million suit, permitting that action to die. But he answered the directors' plea for an injunction with a cross-claim for an injunction against the directors and damages totaling $2,200,000.

More than $200,000 in union funds were frozen for nearly two weeks by the legal tangle. Finally it was agreed that both Sayen and Behncke would sign checks, but neither use the title of president.

Behncke was living up to his reputation for stubbornness, and Sayen, convinced of the rectitude of the directors, wasn't yielding. After several fruitless sessions in which, on the instructions of the court, he sought a basis for settlement, Master-in-Chancery Victor E. LaRue put the argument in focus: "It depends on whether the board of directors acted legally under the by-laws."

Behncke, who wrote most of the by-laws himself, says the directors most certainly did not act legally. One group of attorneys agrees; another disagrees. A non-legal mind studying the by-laws can only be confused.

► **By the Book**—The executive board summoned the directors into session. The by-laws say that on questions of policy the executive board shall send "a ballot . . . to all directors with such explanation as may be necessary and a majority vote of the directors shall govern the actions of the executive board."

When the executive board called the directors into personal session, was that an allowable substitute for sending them "a ballot?"

The directors changed some of the by-laws. The by-laws provide for amendment "by a majority vote of the board of directors at any meeting called by its chairman. . . ."

Special Report

What's behind the change in leadership of the Air Line Pilots Assn., and what does it mean? The airline industry and organized labor have been studying that question ever since early one July morning when David L. Behncke found he had been "recalled" from his presidency of the union. For answers AVIATION WEEK *sent a staff member to Chicago where he talked at length with ALPA's officials and employes, and obtained the only exclusive interview Behncke has granted on the intra-union dispute. The result is a special report, in three parts, the second of which appears on these pages.*

The president of the association, under the by-laws, is chairman of the board of directors. Was the interim committee which was performing the president's functions when the directors were called an allowable substitute for the president?

The directors recalled Behncke and elected Sayen president. In one place, the by-laws provide "The term of office of the officers . . . shall be for two years and thereafter until they are either re-elected or their successors have been elected in accordance with the constitution and by-laws." In another section, it is provided that "all officers shall be . . . elected by a majority vote of the delegates in attendance at such convention." And a third applicable section says "Thirty percent of the entire active association membership in good standing may at any time petition the board of directors and cause a recall ballot to be taken on any . . . officer."

From that reading it may appear that the executive board and directors took several short cuts. If that is a correct interpretation, the court may order Behncke re-instated; or at the least, tell the directors to retrace their steps and stick to the prescribed path.

The result in the end will be the same. A re-instated Behncke would be president only until the next convention.

▶**The Rallying Point**—Those who favored the recall of Behncke declare opposition to him was widespread and deep for a long time. As one says, "this group in New York had one gripe, here's another group in Florida with another gripe, and you had that all over the country. But each group didn't know they weren't alone."

This analysis implies that the movement against Behncke was a spontaneous revolt. But true examples of spontaneous combustion are rare. It would perhaps be more accurate to describe the pilots' revolt as an explosive reaction.

The catalyst for the reaction was the report of the investigating committee. In that report, the dissidents in New York, in Florida, in every other section found at least one thing they had been griping about. The investigating committee report was the red flag of rebellion around which Behncke's opposition rallied.

The committee was chairmanned by G. M. LeRoux, Pan American, and included D. E. Barnette, Southwest; S. W. Camden, Jr., Eastern; V. A. Peterson, Eastern; and K. M. Ruppenthal, TWA. It reported it had heard the president of the association (but Behncke says it did not give him sufficient time to explain his side), the executive vice president, "several" regional vice presidents, members of the headquarters staff, all concerned in the construction of the building, the outside auditor of the association's books, and had studied the minutes of the convention and executive board meetings for the past ten years.

Further, the committee secured the services in a consulting capacity of Dr. A. A. Liveright, director of the union leadership training project of the University of Chicago. The enormous significance of this move became apparent later.

▶**Committee Report**—Nothing could indicate better why the membership was dissatisfied with Behncke than some of the findings and recommendations of the investigating committee:

• **Financial findings.** Strike assessments that have exceeded the amounts paid out in strike benefits have been put in the general fund. "Although the association expends approximately a million dollars a year on its various projects, there is no indication that a budget has ever been set up or that the members of the association have maintained sufficient check on its expenditudes." . . . "Accountingwise, the expenditures of the association have too often been lumped together as 'extraordinary expenses'." . . . "There are indications that persons dealing with the union have been alienated by its 'slow-pay' attitude."

• **Financial recommendations.** Excess collection for strike benefits should be credited to the dues accounts of the respective members. . . . An annual budget should be prepared. . . . Members should exercise greater control over finances through the executive committee. . . . The president's salary should be at least equal to that of a top-bracket airline pilot, the salary of the executive vice president about $9,000 during the first two years and thereafter should be about $12,500. . . . A fulltime secretary-treasurer, who would function as a comptroller, should replace the present separate positions; the new official need not be a pilot and would be appointed by the president and approved by the executive committee (a new group that would be established under another set of recommendations). The secretary and the treasurer now are elected and are active pilots. . . . Cost accounting system should be set up.

• **Headquarters building findings.** No action of the executive board in connection with the building has been ratified by any convention "as is required by the by-laws" and "undertaking the building of a headquarters office building, considering the money involved, is a matter of major policy requiring the ratification of a convention." . . . Various executive boards have authorized $425,000 for the building; the contract price was $449,440; up

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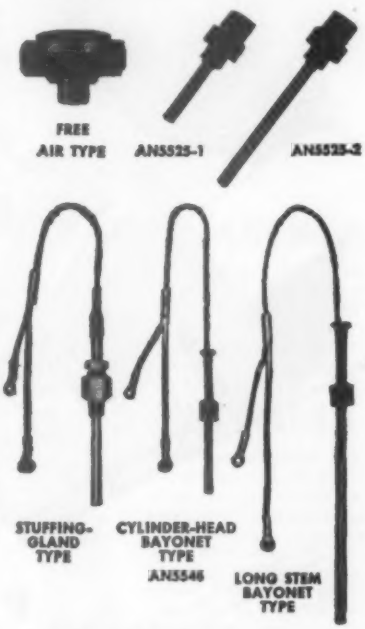

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to date the cost has been $520,566; the completed cost, including land, will be $804,970. . . . There have been more than 220 change orders costing $158,209." . . . While some of the changes have added to the value of the building and made it a better structure, some have departed from accepted building practice." . . . "The building has been constructed with tolerances far closer than normal in construction."

• **Building recommendations.** A three-man interim committee shall meet with the architect and contractor, with the president acting as an adviser, to make all necessary "owner's decisions." . . . The building should be completed "forthwith." . . . The contractor and the architect be permitted to proceed "with no outside interference."

• **Headquarters operations findings.** The headquarters of the ALPA was started by David L. Behncke largely as a one-man organization in which he accomplished all the important functions himself. During the ensuing years the organization grew and several additional professional people were hired. With the possible exception of the negotiators, these staff members have been used as advisors to the president only, without sufficient delegated power and authority to operate in their specialized fields. Because the president did not delegate power or authority to his subordinates, he was saddled with all manner of minor administrative tasks. The physical load of this multitude of tasks is too much for any man, and the work of the association was frequently slowed down because of this bottleneck."

• **Operations recommendations.** The president should "concern himself with the prestige of the association, its contacts, and its public relations in general. . . . The executive vice president should be the general manager of the association. . . . His general duties should include administration and coordination of the activities of the organization . . ."

The report dealt in detail with a suggested plan of reorganization of headquarters. Then it concluded with this recommendation:

"Courses in union leadership training such as given by the University of Chicago, the University of California and other institutions, should be made available to as many local councilmen as possible (it quoted from Liveright's book Union Leadership and Training) to develop more capable, sensitive, intelligent and critical union officers who have the will, the confidence, and the ability to think for themselves; to give these leaders whatever facts, information and skills necessary for successful union operation; and to build greater loyalty to the association."

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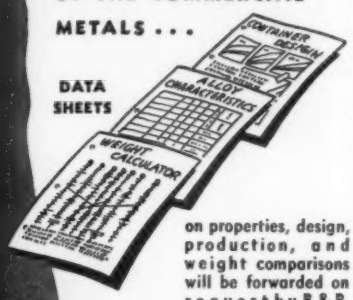

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aptly than this how far the pilots have come from the days when Behncke knew them as "impetuous" men outside the cockpit, and felt he had to protect them against the fruits of their own rashness.

(Next: From labor leader to labor executive, and the new order in ALPA.)

Havana-to-Balboa Run Asked by NAL

National Airlines has asked Civil Aeronautics Board for a route extension from Havana to Balboa—thus throwing another complication into the various problems facing CAB in the New York-Balboa through-service case.

National asks CAB to consolidate this request with the pending Balboa case, through pre-hearing conference and up for full Board hearing in October.

This follows CAB cancellation of its tentative approved National-Panagra interchange at Miami that would have given through service from New York to South America via Miami and Balboa.

This was blocked by Pan American World Airways, which has the Balboa-Miami route used by Panagra to reach Miami. Now that Panagra can't come up to Miami for New York interchange with National, National proposes extension down to Balboa to meet Panagra.

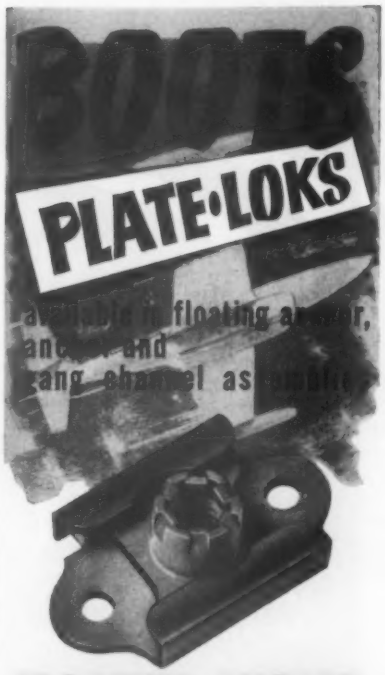
Meanwhile, as was expected, National and Pan American Grace Airways petitioned CAB on behalf of the airline to reconsider and stay execution of the order extending Braniff Airways into Miami from Havana for purposes of through traffic to Balboa and Latin America.

SHORTLINES

► **Air France**—International Airline now limits all trans-Atlantic flights to 34 passengers per Constellation, with sky-lounge seats giving 30% more room per passenger. Air France has also put super-luxury standards on all nine flights a week, whereas only two "Parisian" flights formerly offered the aperitifs and super-service now offered on all nine.

► **Braniff International Airways**—Carrier earned a record $944,000—94 cents a share—the first six months this year, compared with $261,744 a year ago. Braniff has paid two 25-cent dividends recently—Dec. 28, 1950, and June 22 this year. Profit before income taxes was $1,566,708 on revenues of $12,283,634 compared with first half of last year at $402,044 on $9,842,046 revenue.

► **California Eastern Airways**—CEA has



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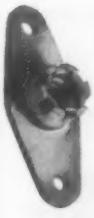

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leased a DC-4 to Twentieth Century Airlines for one year. . . . CEA is flying both the Atlantic and Pacific under military contract.

▶ **Capital Airlines**—Carrier earned a net profit of $719,100 or 92 cents a share the first half of this year, compared with $375,793 a year ago. Operating profit of $1,548,849 on revenue of $18,556,837 compares with last year's $614,560 on revenue of $15,414,248 the first half.

▶ **Continental Air Lines**—CAL netted $210,240 or 68 cents a share the first half, compared with $1,456 a year ago. Company gives a large share of credit for this to charter revenues.

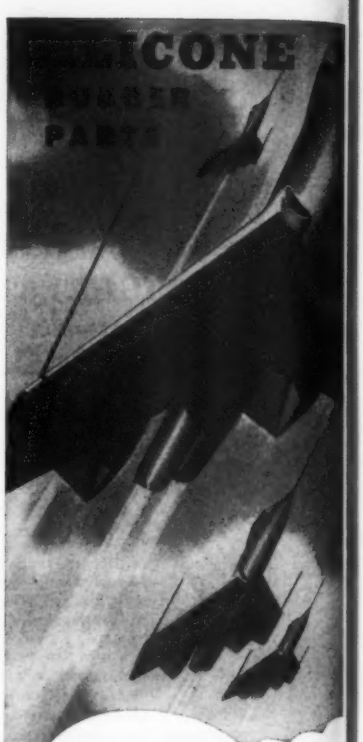
▶ **Flying Tiger Line**—Air freighter has bought 740 feet of property on Sherman Way in Burbank to build a $145,000 office building. . . . Tiger has a contract with the U.S. Immigration Service to move about 7,200 to 20,000 Mexican deportees a month back to Mexica up to Sept. 30. Maximum estimate on revenue for the service is $1,800,000. . . . Gross revenues for the fiscal year ended June 30 are estimated at $18 million, with pre-tax earnings of $2,500,000.

▶ **KLM Royal Dutch Airlines**—KLM is flying coats and dresses from Europe to New York on specially designed racks in a light metal frame. This eliminates crushing, pressing, boxing. First week on the new service brought in over 400 coats designed in Paris and made in Holland.

▶ **Panair do Brasil**—Panam affiliate has the first CAA-designated foreign repair station certificate issued in South America.

▶ **Pan American World Airways**—PAA has asked for an off-season roundtrip fare of $216 to Hawaii from the West Coast—between Oct. 15 and Dec. 20. United has filed for the same. Regular-fare roundtrip is $288.

▶ **United Air Lines**—UAL earned a net of $2,957,558 or $1.31 a common share the first half, compared with a loss of $59,370 or 13 cents a common share a year ago. Net operating income on revenue of $58,220,936 was $7,664,514. A year ago, on revenue of $44,392,652, UAL's operating income was only $467,240 the first half. . . . Second quarter earnings at $1,585,724 or 71 cents a share compared with $1,934,311 a year ago. Main reasons for the slump in earnings: Retroactive mail reduction of $857,067 after taxes; ten-day pilot strike in June. But revenues topped any second quarter in United history at $30,436,355, compared with $26,029,042 a year ago.



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LETTERS

PAA vs. Grace

Your story "CAB Shifts on Miami Interchange" (AVIATION WEEK July 30) seems in need of a little clarification. It begins "Pan American Airways' thrust at its offspring, Pan American-Grace Airways . . ." Actually, of course, as you have pointed out before, there is no conflict between Pan American and Panagra. The conflict is between Pan American and the Grace steamship interests.

Pan American was the earliest exponent of a solution for the irritations caused passengers by a change of plane at Miami. You will recall our appeal, endorsed by a CAB examiner, for a domestic route between New York and Miami so that Pan American and Panagra planes could continue up from Latin America to the northeastern United States. We have vigorously pursued for years every avenue open to us to bring about this much needed improvement in service.

When National unilaterally repudiated its agreements involving a PAA and Panagra interchange, we promptly made a firm commitment with Eastern Air Lines to achieve this for Panagra and some PAA flights. The agreement, vigorously supported by PAA, is now before the Board for approval.

JOHN CREEDY, News Bureau Manager
Pan American World Airways System
135 E. 42 St.
New York 17.

Guest's Control

The undersigned are the attorneys for Aerovias Guest, S.A., a Mexican air carrier. We have been requested to call to your attention an article appearing in AVIATION WEEK July 2 . . . The statement appearing in the mentioned article, "Aerovias Guest, which bills itself as 'Mexico's International Airline,' although it is owned and directed by Winston Guest, an American . . ." is false in fact. It is a reflection on the integrity of the company in that it implies that the company misrepresents its status and operates under false pretenses. The statement further constitutes a charge that the company operates in violation of the Mexican laws under which it is incorporated, which require that the company be majority-owned and majority-directed by Mexican nationals, under penalty of confiscation.

The facts are that the majority of the company's stock is owned by, and the majority of its directors are, Mexican nationals . . . Under the circumstances, therefore, we request that you write a letter of apology to our client . . . so that it may be exhibited at the Ministry of Communications of Mexico.

EDWARD F. HUBER,
Dean, Magill, Huber & Horrigan
New York 6.

(The story in question came from one of our Mexican correspondents. We have asked him to comment on the story and the letter above. We are publishing this letter, although the correspondent's reply has not yet been received.—ED.)

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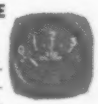

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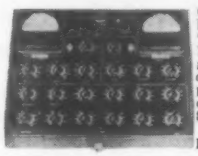

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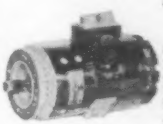

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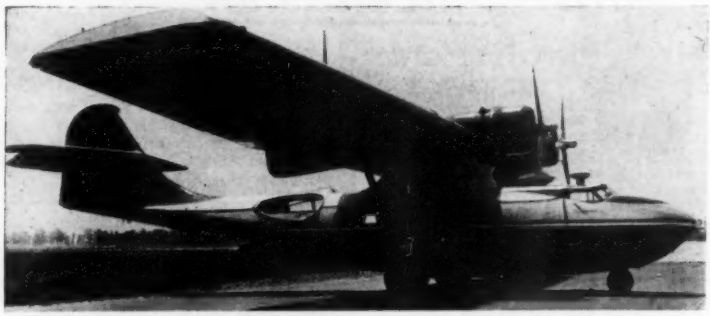

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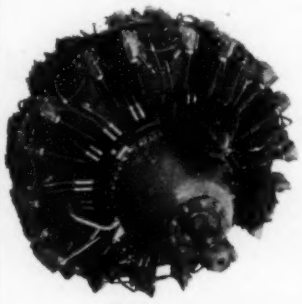

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27953	8427	Screw
1276	10759	Bolt
900	11210	Cover
100	11762	Guide
1157	35787-5	Bushing
2174	35787-10	Bushing
814	35814	Blower Assy.
3967	35817	Spring
280	35855	Cap
2446	35924	Washers
4200	35932	Gasket
22	36759	Rod Assy.
182	46400E	Liner
30	48346	Cylinder
1475	48360	Bearing
53	48362	Shaft
175	48363	Shaft
100	48389	Fitting
209	48390	Retainer
56	48399	Sump
533	48447	Bushing
107	48457	Adapter
390	48461	Gear
149	48468	Bearing
90	48468B	Bearing
389	48469	Bearing
470	48470	Bearing
75000	51506	Plug
395	54847	Clamp
71	57006	Cover
78	76236	Gear
565	81397	Tube
10736	84185	Cover Assy.
261	84235	Pipe
155	84281	Spacers
1351	84282	Adapter
1178	84289	Bearing
113	84487	Housing
87	84567-8	Stud
77	84591C	Nose Housing
178	84602	Bracket
30	84702	Shroud
397	84752	Bearing

ELECTRONIC COMPONENTS

Quantity	Part No.	Description
35	RA-10-DB	Receiver
20	TA12B	Transmitter
150	DA-1F	Dynamotor
35	MR-98	Control Box
9000	45	Bulb
11000	1667	Bulb
1000	987	Bulb
300	AN3135-1	Bulb
97	FT213A	Mount
29	FT293	Mount
80	BX42-7	Dynamotor
6	RTA-1B	Transceiver

WALTER KIDDE FIRE AND OXYGEN EQUIPMENT

Quantity	Description
341	981280 Cylinder CO^2 w/valve Wt. Empty 18.5 lbs. Wt. of Charge 12.6 lbs. Valve number 979453 J
19	M8700368 Cylinder CO^2 Wt. Empty 5.48 lbs. Wt. of Charge 3.62 lbs.
22	982512 Cylinder CO^2 w/valve Wt. Empty 11.65 lbs. Wt. of Charge 7.25 lbs. Valve number 979453 J
96	992255 Cylinder CO^2 (type 5A-hand fire extinguisher) Full wt 14.3 lbs.
93	923748 Oxygen cylinder (full) w/valve #X4015 Charges to 1800 PSI
150	982056 Valve 1-1/2" flare tube threads
150	966129 Solenoid (28 Volts)
225	981591 Gate Valve With 3 1-1/2" Flare tube threads
151	870082 (Model A4614) pressure switch Manually or pressure operated
326	982585 Gate Valve with 1-1/4" Flare tube threads

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1000	AN 5780-2	Wheel and flap position Indicator G. E.—Individual cans
400	AN 5780-2	Weston Model 882-PN111602 Description as above
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700	TFD 8600	Thompson fuel booster pump
125	D-7818	Adel anti-icer pumps
170	2-P-771-A	Pesco fuel pump AN4102-1
250	AN4014	Erie Meter Systems D-3 hand wobble pump
300	1H260k and KA	Pesco Hydraulic hand pump
478	D9530	Adel selector valve
233	D9530-2	Adel selector valve
428	D9560-2	Adel selector valve
744	D10044	Adel selector valve
2200	AN 4078-1	37D6210 Solenoid United Aircraft etc.
2000	AN 3096-4	Grimes Light assembly
800	AN 3096-5	Grimes Light assembly
380	AN 3096-6	Grimes Light assembly
175	EE 709-M2	Air Associates Motor
115	P4CA2A	Parker Primers
80	AN 3213-1	Scintilla Ignition switch
568	A-9 (94-32226)	Ignition switch
687	R5-2	Mallory Selector boxes
380	AN 6203-1	Vickers Hydraulic Accumulator
88	572-3A	Eclipse Distributor Valve
90	JH-950R	Jack & Heintz Starter Motor for JH5 starters
492	S841 (94-32253)	Electric box
12	FA122	Flasher Exterior lights Wallace & Tiernan
1000	13018A	Interphone Box
244	D10051	Selector Valve (Adel)
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144	K14949E	Windshield Wiper Kit (Marquette Metal Products)
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Discarding the Ground Weather Theory

(This is the second of a series on All-Weather Flying. Part I appeared in the July 23 issue of AVIATION WEEK.*)*

The work of the Sperry Gyroscope Co., the Royal Aircraft Establishment, and the Landing Aids Experiment Station has established the inaccuracy of ground weather observations and indicated the fallacy of attempting to operate a system of air transportation requiring bad weather landings controlled by ground weather observation minima. The critical altitude concept, taken by IATA and ICAO, based on safe aircraft, pilot performance and terrain, appears capable of producing better results.

► **The Steps**—The first step in an all-weather program, therefore, is to discard the weather theory for a plan based on critical altitude.

The second step is to list the actual ingredients required. These facilities already exist, not merely on paper, but in actual working condition. Only trouble is that they are scattered over many airports.

First, of course, an airport is needed. The instrument runways (a minimum of two are essential) must have clear approaches; no stacks, apartment houses or gas tanks for roughly 3 miles in either direction. Considering a single instrument landing runway only, it does not have to be of abnormal size. A 7,000-ft. strip should be ample today.

Bold painted runway surface marking and high intensity, wide angle lights must adorn this runway. Suitable marking diagrams and adequate lights are in existence and many airports have usable runways.

The work of every all-weather group to date specifically states that the last part of the instrument approach, as well as the landing, must be accomplished visually. This means approach lights for both ends of each instrument runway. And these too, are in existence, at Newark Airport. Stripped of all double-talk, the approach light situation is no problem. The Newark lights (single centerline system; incandescent plus condenser discharge lights) are the only answer.

Now add the electronics. Two ILS (one for each direction of approach) with suitable monitors, inner and outer compass locators and GCA for each runway. The airplane requires only an automatic pilot and approach coupler in addition to standard airline radio equipment.

This completes the list of needed equipments. Note again: All the components exist today in practical operation. Two terminals, plus two alternate airports, equipped to these specifications would provide an ideal airline operation. The system could be "proved" by an air freight operation with regular line pilots.

Man has always been balked (delayed but not stopped) by nature in her extreme moods. But such extremes are not numerous. All "normal" bad weather could be flown with the proposed arrangements.

► **The Essentials**—The ILS provides the "path" to the runway. The compass locators give the pilot "proof" of position which in turn can be further "proved" by GCA. The automatic pilot coupled to the ILS frees the pilot from a burdensome and time consuming menial task, control manipulation. He is then free (master—not helmsman of the ship) to keep ahead of the operation, to check the behavior of all components, receive wind and traffic information and watch for those all-important approach lights. These lights "tie" the airplane to the runway from the "electronic minimum." From their appearance the pilot can determine whether the landing can be successfully completed. The well-lighted runway, plus markings, allows the pilot to contact and stay on the pavement. Adequate length and clear approaches provide some leeway in contracting the ground and using brakes.

Other luxuries could be added. But these essentials alone will do the job. If one or more airlines, together with the CAA, would spearhead such a program, the days of all-weather procrastination would be over.

AVIATION CALENDAR

Aug. 11-19—Eighth annual Michigan aviation, week, sponsored by the Aero Club of Michigan.

Aug. 15-19—Fifth annual all-woman transcontinental air race, sanctioned by the Ninety-Nines, Santa Ana, Calif., to Detroit, Mich.

Aug. 18-19—National Air Race, Detroit, Detroit-Wayne Major Airport.

Aug. 22-24—Western convention of Institute of Radio Engineers and Seventh Annual Pacific electronic exhibit.

Aug. 22-26—International convention of the Ninety-Nines, Mackinac Island, Michigan.

Aug. 24-26—Fifth annual convention of the Air Force Assn., Ambassador Hotel, Los Angeles, Calif.

Sept. 3-7—Royal Aeronautical Society-IAS third international aeronautical conference, Brighton, Sussex, England.

Sept. 10-14—Sixth national instrument conference and exhibit sponsored by the Instrument Society of America, Sam Houston Coliseum, Houston, Tex.

Sept. 10-16—Seventh annual general meeting of the International Air Transport Assn., Westminster School, London, England. Program includes one-day visit to SBAC Farnborough show.

Sept. 11-16—Twelfth flying display and exhibition of the Society of British Aircraft Constructors, Farnborough, England.

Sept. 18-20—Meeting of the meteorology committee of the Air Transport Assn., Greystone Lodge, Denver, Colo.

Sept. 26-28—Fall meeting of the American Society of Mechanical Engineers, Hotel Radisson, Minneapolis, Minn.

Oct. 2-4—Seventh annual aircraft spark plug and ignition conference sponsored by the Champion Spark Plug Co., of Toledo, Ohio.

Oct. 8-10—Special conference on aircraft electrical applications, sponsored by the Air transportation committee of the American Institute of Electrical Engineers and the Los Angeles section of the Institute, Hollywood Roosevelt Hotel, Hollywood, Calif.

Oct. 11-12—1951 conference on airport management and operation, University of Oklahoma, Norman, Okla.

Oct. 16-17—Fourth annual New York State conference on airport development and operations, sponsored by the N. Y. State Dept. of Commerce, N. Y. Aviation Trades Assn., Assn. of Towns of the State, Conference of Mayors, County Officers' Assn. and the N. Y. State Flying Farmers, Onondaga Hotel, Syracuse, N. Y.

Oct. 24-25—1951 annual convention of the National Assn. of State Aviation Officials, Arizona Inn, Tucson, Ariz.

Oct. 29-30—Air Industries & Transport Assn. of Canada annual general meeting, Seigniory Club, Montebello, Quebec.

PICTURE CREDITS

9—(Hawker) McGraw-Hill World News; (Buccaneer) Levy—Shipp; (Fokker) Howard Levy; (Super Connie) Lockheed; 14—Fairchild Aircraft; 16—Convair; 21-23—Pratt & Whitney Aircraft.

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EX-CELL-O CORPORATION 39
Agency—Holden, Clifford, Flint, Inc.

FAFNIR BEARING CO., THE 5
Agency—Horton-Noyes Co.

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Agency—Dunwoodie Advertising

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Agency—Charles W. Hoyt Co., Inc.

GULF OIL CORPORATION 46
Agency—Young & Rubicam, Inc.

HARTWELL AVIATION SUPPLY CO. 22
Agency—The McCarty Co.

LEACH RELAY COMPANY 77
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LEWIS ENGINEERING CO., THE 73

MARMAN PRODUCTS CO., INC. 65
Agency—West-Marquis, Inc.

McGRAW-HILL BOOK CO., INC. 82

MONADNOCK MILLS 80
Agency—H. B. Humphrey, Alley & Richards, Inc.

NORTH AMERICAN AVIATION, INC. 85
Agency—Batten, Barton, Durstine & Osborn, Inc.

NORTHROP AIRCRAFT, INC. 68, 69
Agency—West-Marquis, Inc.

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PARKER WHITE METAL CO. 64
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SEARCHLIGHT SECTION 78, 79, 80, 81, 82, 83, 85

SHELL OIL COMPANY 35
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Agency—Asher, Godfrey & Franklin, Inc.

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ZENITH PLASTICS COMPANY 44, 45
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(Classified Advertising)

EMPLOYMENT
Positions Vacant 78, 79, 80, 81
Positions Wanted 78

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EDITORIAL

LARGEST "PEACETIME" MILITARY BUDGET—That is how the press described appropriations submitted to the House of Representatives last week. These included nearly $15 billion for air power.

Observers on Capitol Hill expected generally favorable consideration of aviation sums. The representatives of the people showed little inclination to "coast" on the Communists' bid for a cease-fire in Korea. Defense Secretary Marshall's angry explosion some days earlier over a "tragic and humiliating" let-down reaction of the American people to Red Malik's honeyed words was as unjustified as they were unnecessary. The people are sold on military strength for the U.S. and will brook no sizable curtailment of it. As far as air power is concerned, the nation is far ahead of its " leaders." Nor do we believe the people will stand still indefinitely for any artificial "dollar for Army, dollar for Navy, dollar for Air" hokus pokus.

We shall not forget, either, that it was Gen. Marshall who admitted publicly recently that if it were deemed that cuts must be made in funds, he would prefer them to be carved out of our own U.S. military budget instead of slicing our financial aid to our European allies. Perhaps we should regret that we have only one country to give up to the Europeans. This kind of language is difficult for some Americans to take, especially from the "leader" who happens to hold the title of Secretary of Defense.

•

GOOD LUCK TO THE AIR RACES—For reasons that baffle us, the National Air Races are being resumed this year. We hope, at least, that participation of military aircraft in this Detroit edition will in some way affect the public favorably toward air power. We also pray that as many good citizens and pilots will be alive at the end of the two-day Roman holiday as when it started.

•

TURBOPROP LEADERSHIP of this country over Great Britain still is not generally realized by the press and public here. Now, before the British exhibitions at Farnborough next month, would be a smart time for our companies engaged in turboprop work to issue some new progress reports for public consumption. If they wait until after Farnborough, the papers will be too full of more news about British superiority over us in straight jets. Many more U.S. industry leaders will be going to Farnborough this year than ever before.

•

ANOTHER LOOK AT FLYING BOATS will bring a few blinks to the skeptics, some Navy and Consolidated Vultee men think. They will be watching those new four-engined turboprop boats that Navy has ordered. Except perhaps for dirigibles, flying boats have suffered most in the services' general reluctance to stare the military air transport problem squarely in the face. Entirely apart from combat possibilities, the flying boat may still open up new vistas of military air transport. Even the Navy's four old and obsolescent Martin Mars ships are still running up a ton mile cargo record between the West Coast and Pearl Harbor that has received too little publicity. Radical improvements in hull and wings, combined with the new turboprop power, may put the new Convair flying boats in the top class for some transport jobs. The Navy deserves commendation for sticking to its guns on the flying boat subject.

•

WITH ALL THE PRESS RELATIONS EXPERTS that the Air Force has, they should have done a better job of unconfusing the public on this moot subject of groups and wings. But 'tis not so. From the Secretary of Air on down, the preferred terminology is "wing," and not "group."

The group is a flight unit of combat planes only. But each group is supported by such non-plane units as an air-base group, a medical group, and maintenance-supply group, all of which form a wing.

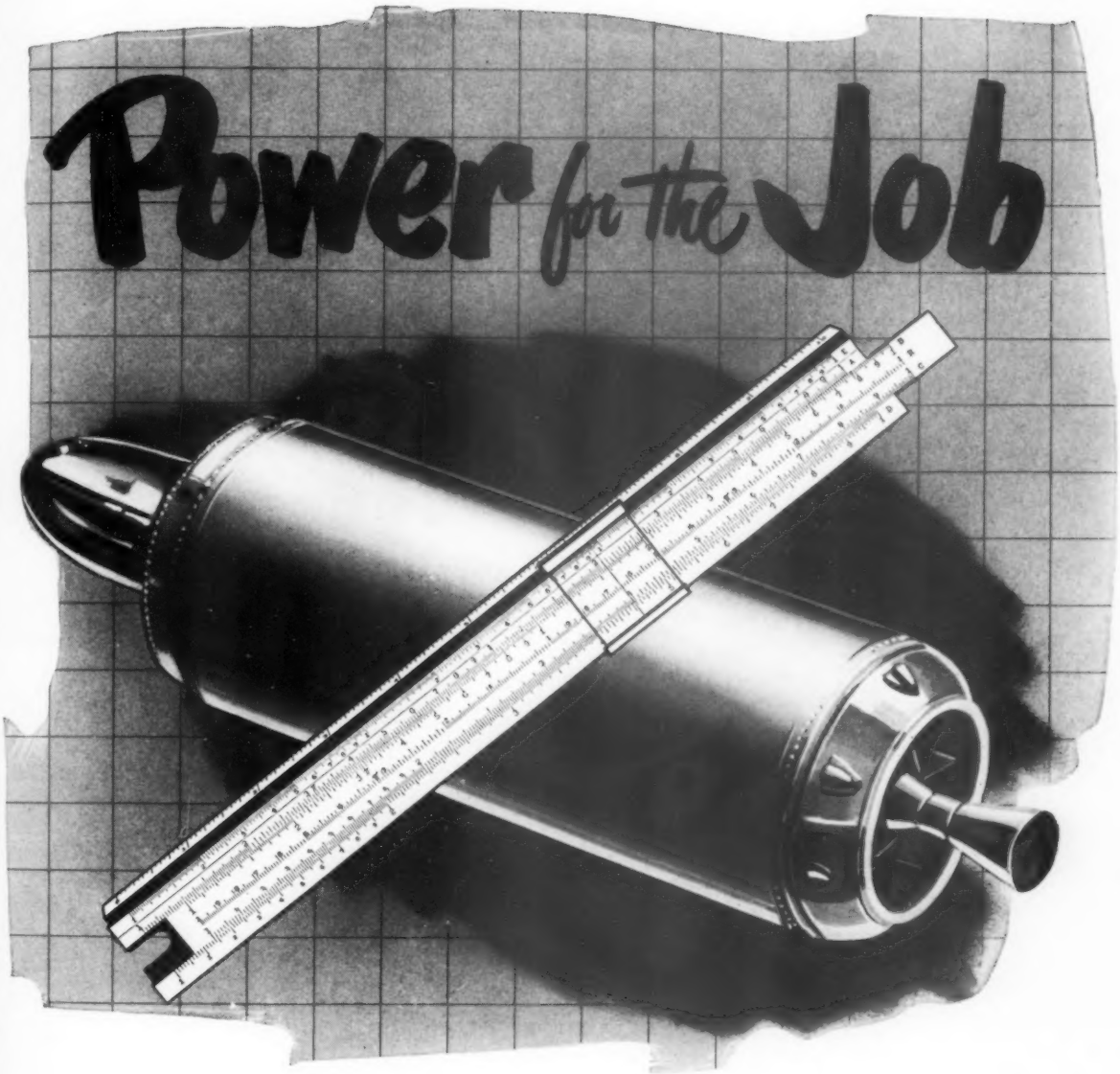
When you get to numbers of planes in a group, you begin to enter obfuscation. The last report we had is that a heavy bomber group comprises not more than 30 planes. Medium bomber groups may have 30 to 45 planes plus some flying tankers. The official number of ships in a light bomber group is 48. But these figures vary downward. A group may be operating at less than full strength. But it's still a "group." So that you can't possibly compute accurately the number of operational planes in the Air Force even if you know the current group strength.

Although the press considered it surprising, readers of AVIATION WEEK didn't when it was revealed on Capitol Hill the other day that the USAF had only 87 B-36s in service, while 60 others were on the ground being modernized.

Last June 5, AVIATION WEEK reported that the backbone of the USAF long-range striking force is still the modified bomber of the last war—mostly improved B-29s and B-50s. "Despite widespread publicity of the big six-engined B-36 as a weapon in being, few of these are operational at the present time although well over 100 have been built . . . . today SAC has three B-36 bombardment groups, none of which is completely equipped, and a fourth group is due for conversion." Last February AW had told you, "Three of the 14 (SAC) groups are equipped, although not completely, with the B-36 . . ." If they had been completely equipped, there would have been 90 of the big busters ready for action. But there weren't that many then, and there aren't now.

—Robert H. Wood

Power for the Job



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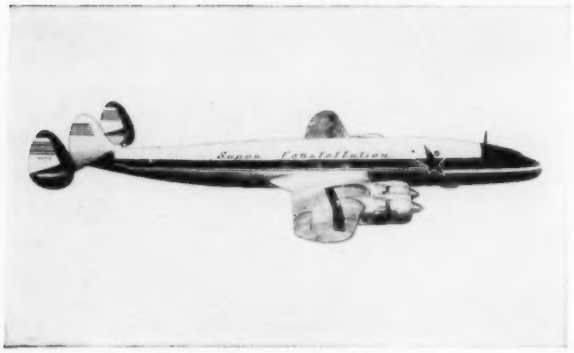

Lockheed's new model Constellations, and all Super-Connies use General Electric protective systems. G-E provides the fastest possible tripping of overvoltage faults—and freedom from nuisance tripping.

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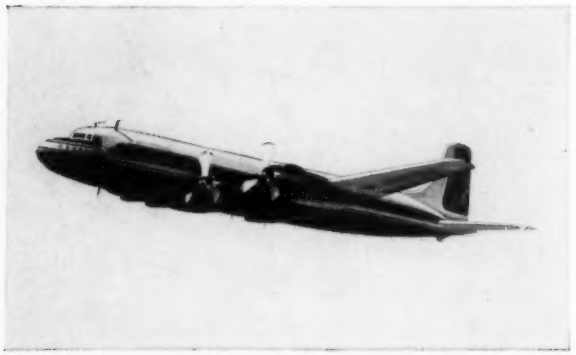

New Douglas DC-6B's being built for Pan American World Airways will be equipped with G-E electrical systems. G-E provides the most complete electrical protective systems ever placed in production for commercial transport-type aircraft.

The country's first turboprop transport—the Convair-Allison Turboliner—is equipped with a G-E electrical system. G-E systems are tailor-engineered to give the protection you need for ordinary or special applications.

The list of planes using G-E protective systems is a roll call of today's most popular aircraft. Are your planes listed among them?

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